TSYLEV, A.L., inzh.

Simplified angle-steel trolley holders. Mont.i spets.rab.v stroi. 22 no.6:28-29 Jl '60. (MIRA 13:7)

1. Sverdlovskoye montazhnoye upravleniye tresta Uralelektromontazh.
(Fastenings)

TSYLEV, A.L., inzh.

Simplified holder made of angle steel for contact wires in factories. Energetik 8 no.2:20 F '60. (MIRA 13:6)
(Industrial electric trucks)

TSYLEV, A.L., inzh.

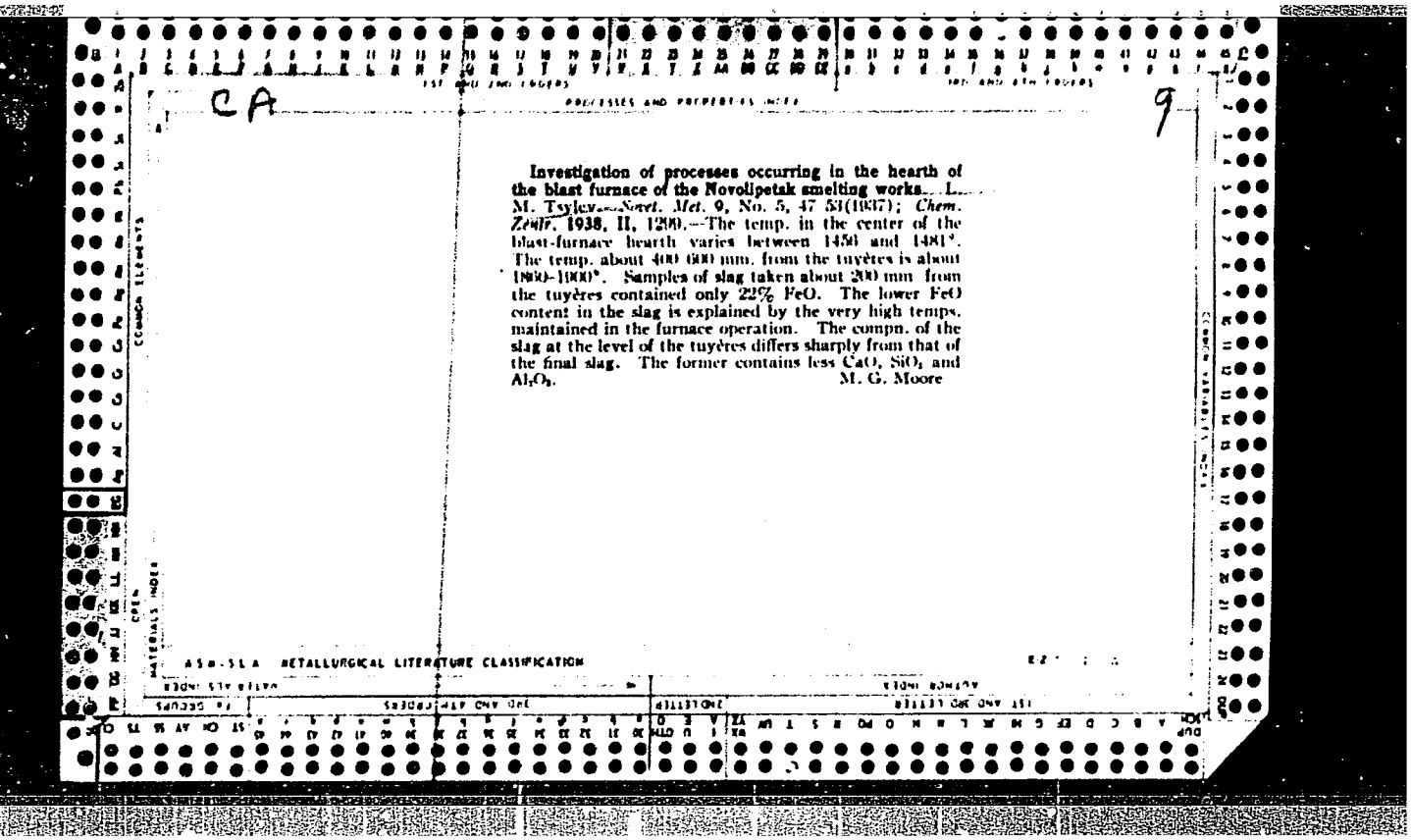
Machinery for laying pipelines by the method of pushing. Mov. tekh. mont. i spets. rab. v stroi. 21 no. 8:18-19 Ag '59.
(MIRA 12:10)

1.Sverdlovskoye montazhnoye upravleniye tresta Uralelektromontazh.
(Pipelines)

TSYLEV, A.L., inzh.

Installing inserted electric wiring parts during building operations. Nov. tekh. mont. i spets. rab. v stroi. 21 no.2: 25-27 F '59. (MIRA 12:1)

1.Sverdlovskoye montazhnoye upravleniya tresta Uralelektromontazh.
(Electric wiring)



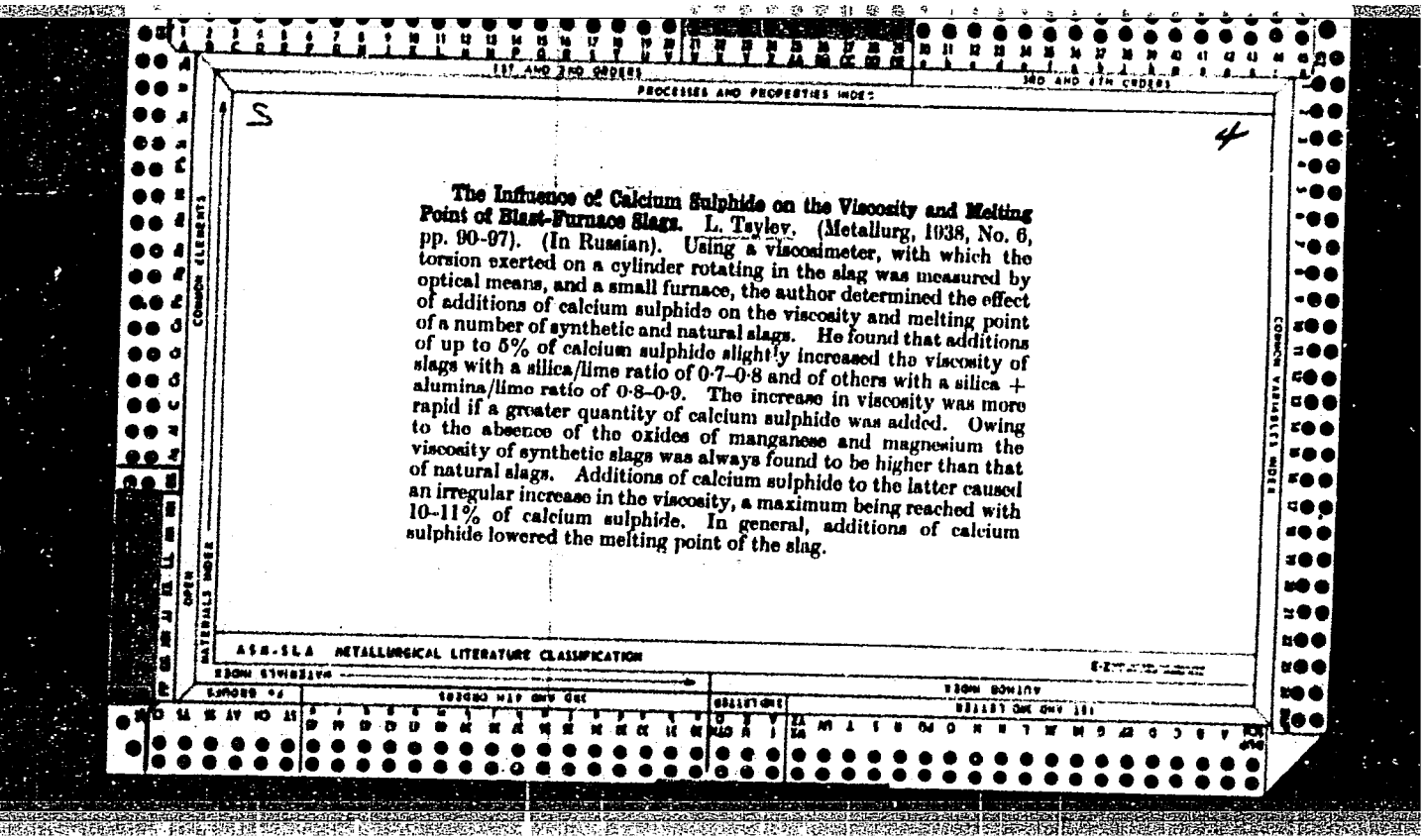
CA

9

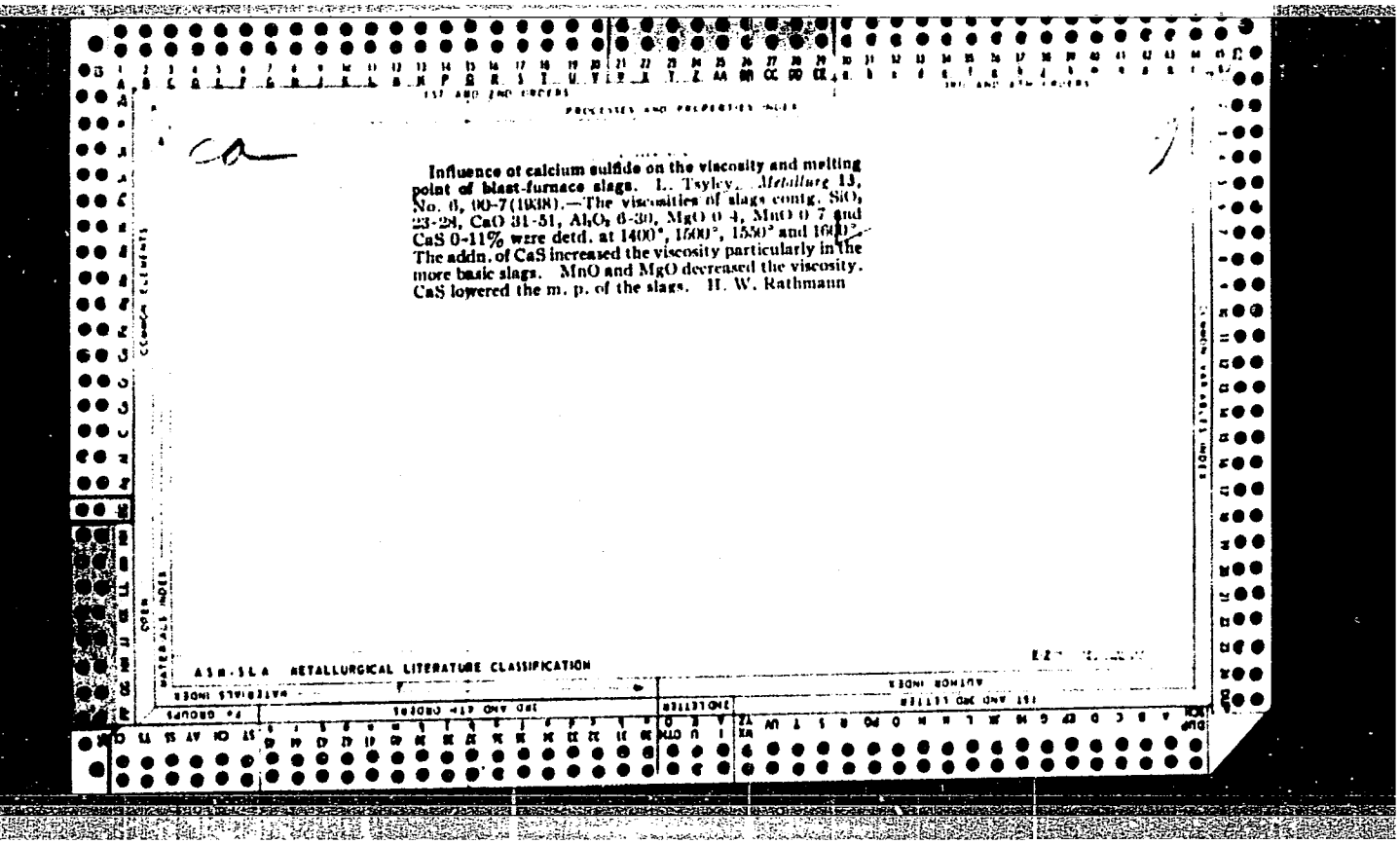
Investigation of processes occurring in the hearth of the blast furnace of the Novolipetsk smelting works. L. M. Tsylev.—*Sovet. Met.* 9, No. 5, 47-51(1937); *Chem. Zentr.* 1938, II, 1200.—The temp. in the center of the blast-furnace hearth varies between 1450 and 1481°. The temp. about 400-600 mm. from the tuyères is about 1800-1900°. Samples of slag taken about 200 mm. from the tuyères contained only 22% FeO. The lower FeO content in the slag is explained by the very high temps. maintained in the furnace operation. The compn. of the slag at the level of the tuyères differs sharply from that of the final slag. The former contains less CaO, SiO_2 and Al_2O_3.

M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



The Influence of Calcium Sulphide on the Viscosity and Melting Point of Blast-Furnace Slags. L. Tsylev. (Metallurg, 1938, No. 6, pp. 90-97). (In Russian). Using a viscosimeter, with which the torsion exerted on a cylinder rotating in the slag was measured by optical means, and a small furnace, the author determined the effect of additions of calcium sulphide on the viscosity and melting point of a number of synthetic and natural slags. He found that additions of up to 5% of calcium sulphide slightly increased the viscosity of slags with a silica/lime ratio of 0·7–0·8 and of others with a silica + alumina/lime ratio of 0·8–0·9. The increase in viscosity was more rapid if a greater quantity of calcium sulphide was added. Owing to the absence of the oxides of manganese and magnesium the viscosity of synthetic slags was always found to be higher than that of natural slags. Additions of calcium sulphide to the latter caused an irregular increase in the viscosity, a maximum being reached with 10–11% of calcium sulphide. In general, additions of calcium sulphide lowered the melting point of the slag.



Influence of calcium sulfide on the viscosity and melting point of blast-furnace slags. L. Tsylev. *Metallurg* 13, No. 6, 90-7(1938).—The viscosities of slags contg. SiO_2 23-28, CaO 31-51, Al_2O_3 6-30, MgO 0-4, MnO 0-7 and CaS 0-11% were detd. at 1400°, 1500°, 1550° and 1600°. The addn. of CaS increased the viscosity particularly in the more basic slags. MnO and MgO decreased the viscosity. CaS lowered the m. p. of the slags. H. W. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KANAVETS, P.I.; GESS, B.A.; SPORIUS, A.E.; CHERNYSHEV, A.M.; MELENT'YEV, P.N.; CHERNYKH, V.I.; KHROMYAK, R.P.; KHAYLOV, B.S.; BORISOV, Yu.I.; TSYLEV, L.M.; SOKOLOV, V.S.; Prinimali uchastiye: MARKIN, A.A.; GORLOV, M.Ya.; VORONOV, Yu.G.; BULAKHOV, K.A.; KREMYANSKIY, V.L.; ARSHINOV, G.P.; MAZUN, A.E.; PISARNITSKIY, I.M.; BOKUCHAVA, O.A.; KIRILLOV, M.V.; TSELUYKO, P.I.; POLYAKOV, G.O.; REZKOV, A.S.; ZHUCHKOV, M.I.; ROMASHKIN, A.S.; ZUBKOV, A.S.; KOZLOV, N.N.

Pilot plant for the nodulizing of finely ground charge mixtures by the method of chemical catalysis. Trudy IGI 22: 93-109 '63. (MIRA 16:11)

CHERNYSHEV, A.M.; GESS, B.A.; KANAVETS, P.I.; MELENT'YEV, P.N.; KISELEV, G.P.; TSYLEV, L.M.; BORISOV, Yu.I.; CHERNYKH, V.I.

Metallurgical properties of granules prepared by the method of chemical catalysis. Trudy IGI 22:39-49 '63. (MIRA 16:11)

TSYLEV, L. M., CHIZHEVSKII, N. P., ACADEMICIAN

"Desulfurization of Pig Iron by Means of Calcium Carbide in the Nono-Lipetsk Plant," Iz. Ak. Nauk SSSR, Otdel. Tekh. Nauk, No. 5, 1941. Submitted 4 Feb 1941.

U-1530, 25 Oct 1951

TSYLEV, L. ...

Mbr., Inst of Metallurgy, Acad Sci (-1943-)

"The Smelting of Ferromanganese from Manganese ores of the Northern Deposit at the Kushvinskiy Platn," Iz AK Nauk SSSR. Otdel, Tekh, Nauk, No. 8, 1943.

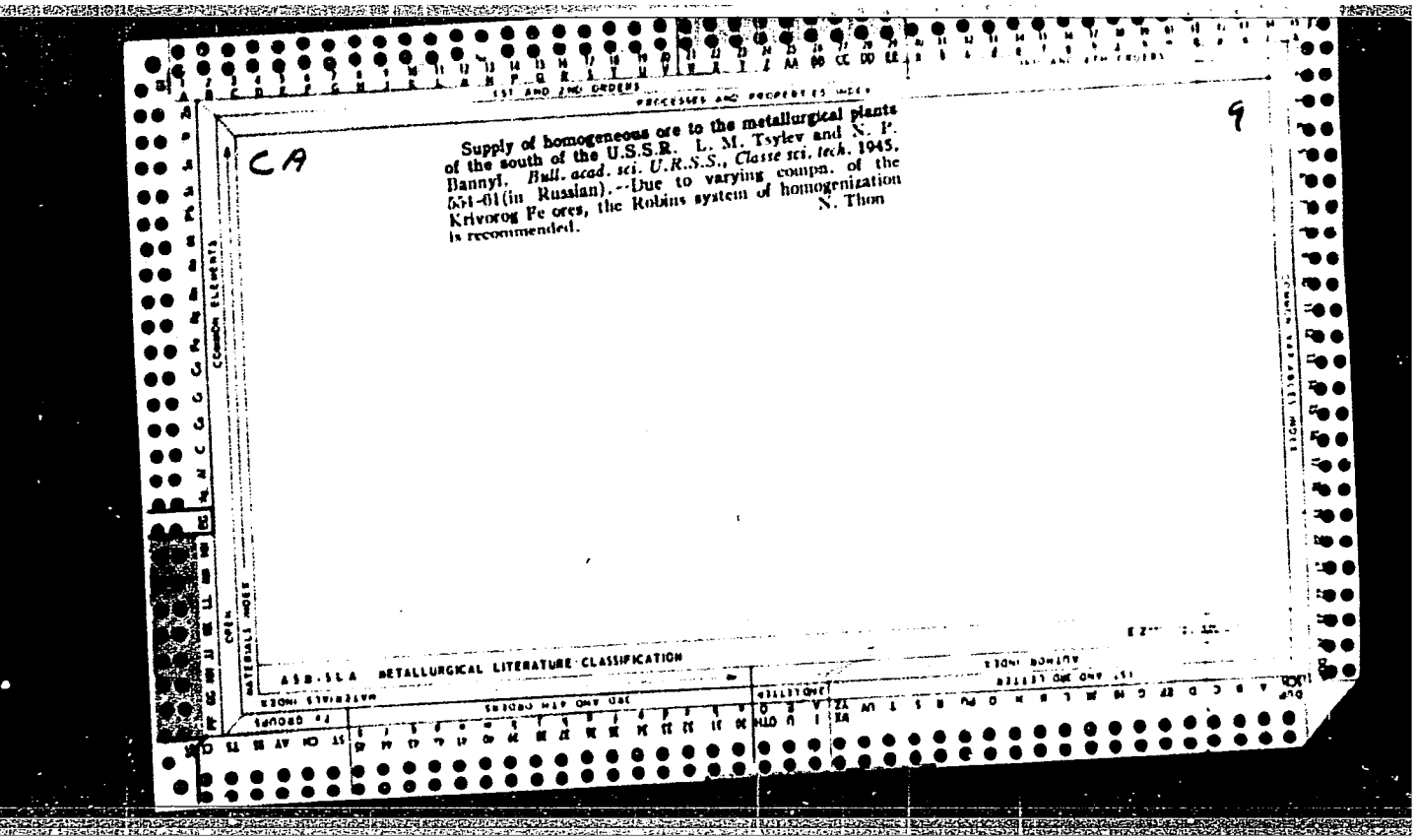
BR-52059019

TSYLEV, L. M.

Mbr., Inst of Metallurgy, Acad Sci (1943)

"Concerning the Optimum Composition of Slag and the Waste of Manganese in Smelting Ferromanganese," Iz Ak Nauk SSR. Otdel, Tekh, Nauk, No. 11-12, 1943

ER-52059019

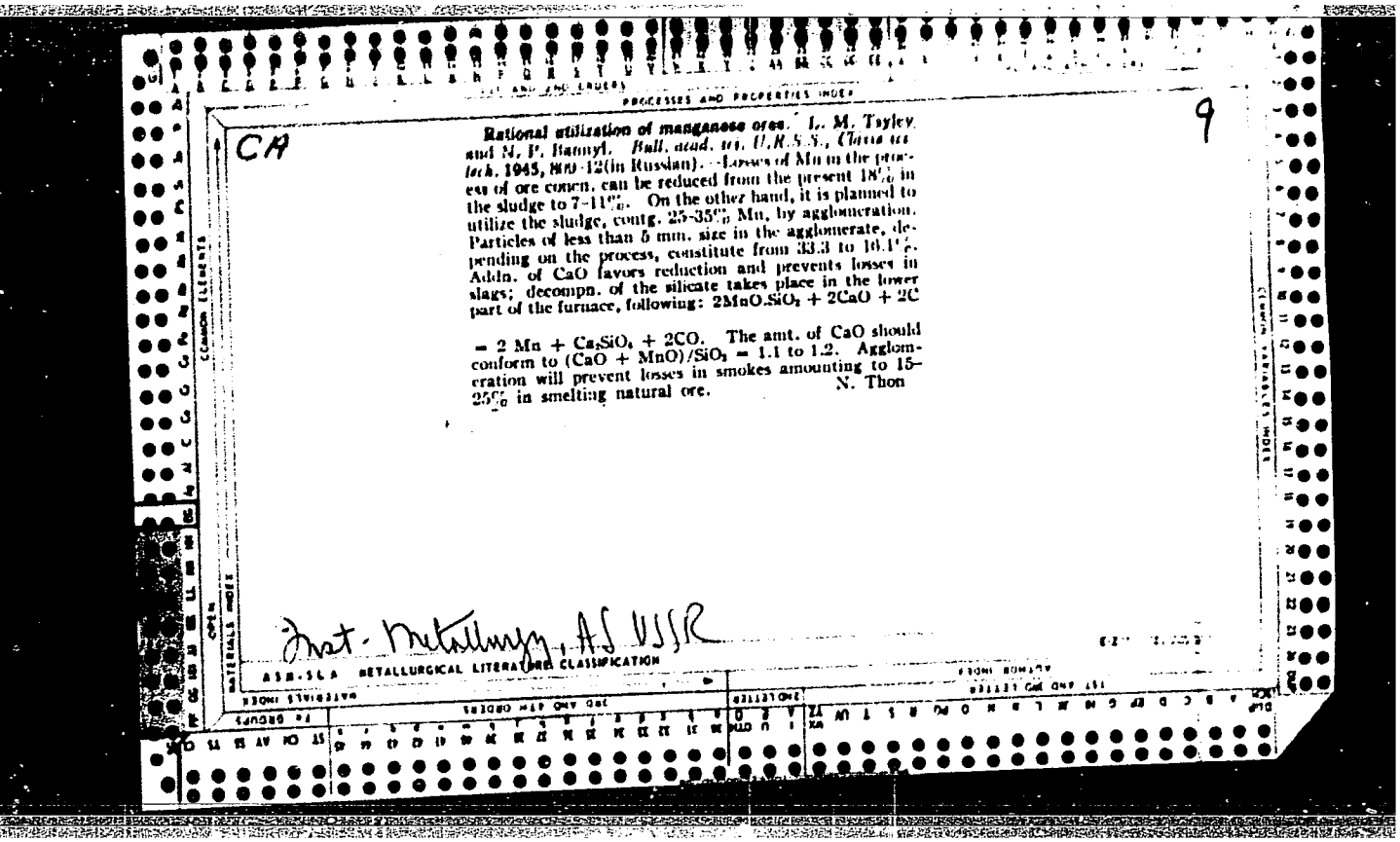


CA

9

Supply of homogeneous ore to the metallurgical plants of the south of the U.S.S.R. L. M. Tsylev and N. P. Bannyi. *Bull. acad. sci. U.R.S.S., Classe sci. tech.* 1945, 551-61(in Russian).--Due to varying compn. of the Krivorog Fe ores, the Robins system of homogenization is recommended. N. Thon

A S B - S L A METALLURGICAL LITERATURE CLASSIFICATION

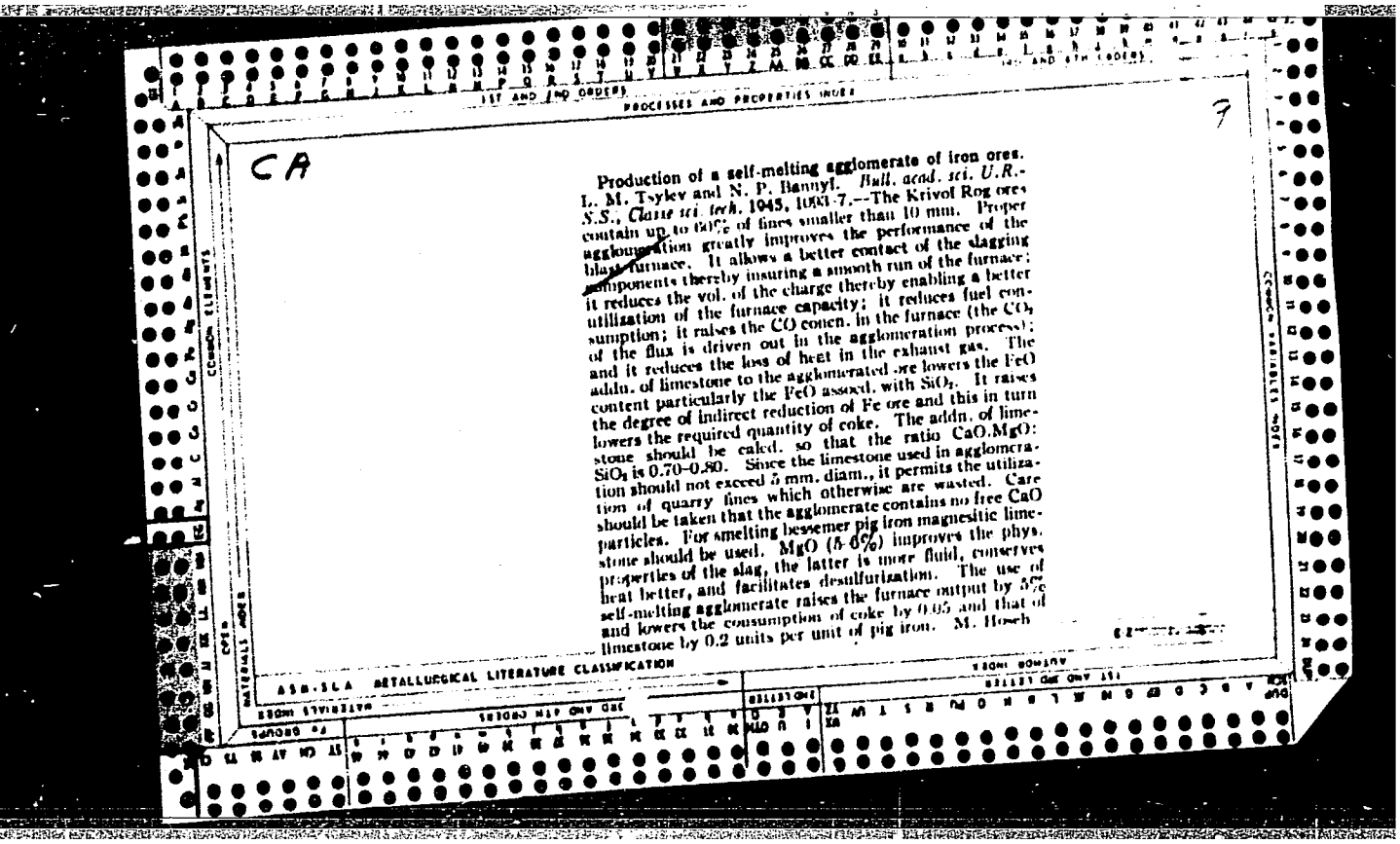


CA

9

Rational utilization of manganese ores. L. M. Tsylev and N. P. Hannyl. *Bull. acad. sci. U.R.S.S., Classe sci. tech.* 1945, 869-72(in Russian).—Losses of Mn in the process of ore concn. can be reduced from the present 18% in the sludge to 7–11%. On the other hand, it is planned to utilize the sludge, contg. 25-35% Mn, by agglomeration. Particles of less than 5 mm. size in the agglomerate, depending on the process, constitute from 33.3 to 16.1%. Addn. of CaO favors reduction and prevents losses in slags; decompn. of the silicate takes place in the lower part of the furnace, following: $2MnO.SiO_2 + 2CaO + 2C$ = $2Mn + Ca_2SiO_4 + 2CO$. The amt. of CaO should conform to $(CaO + MnO)/SiO_2 = 1.1$ to 1.2. Agglomeration will prevent losses in smokes amounting to 15–25% in smelting natural ore. N. Thon

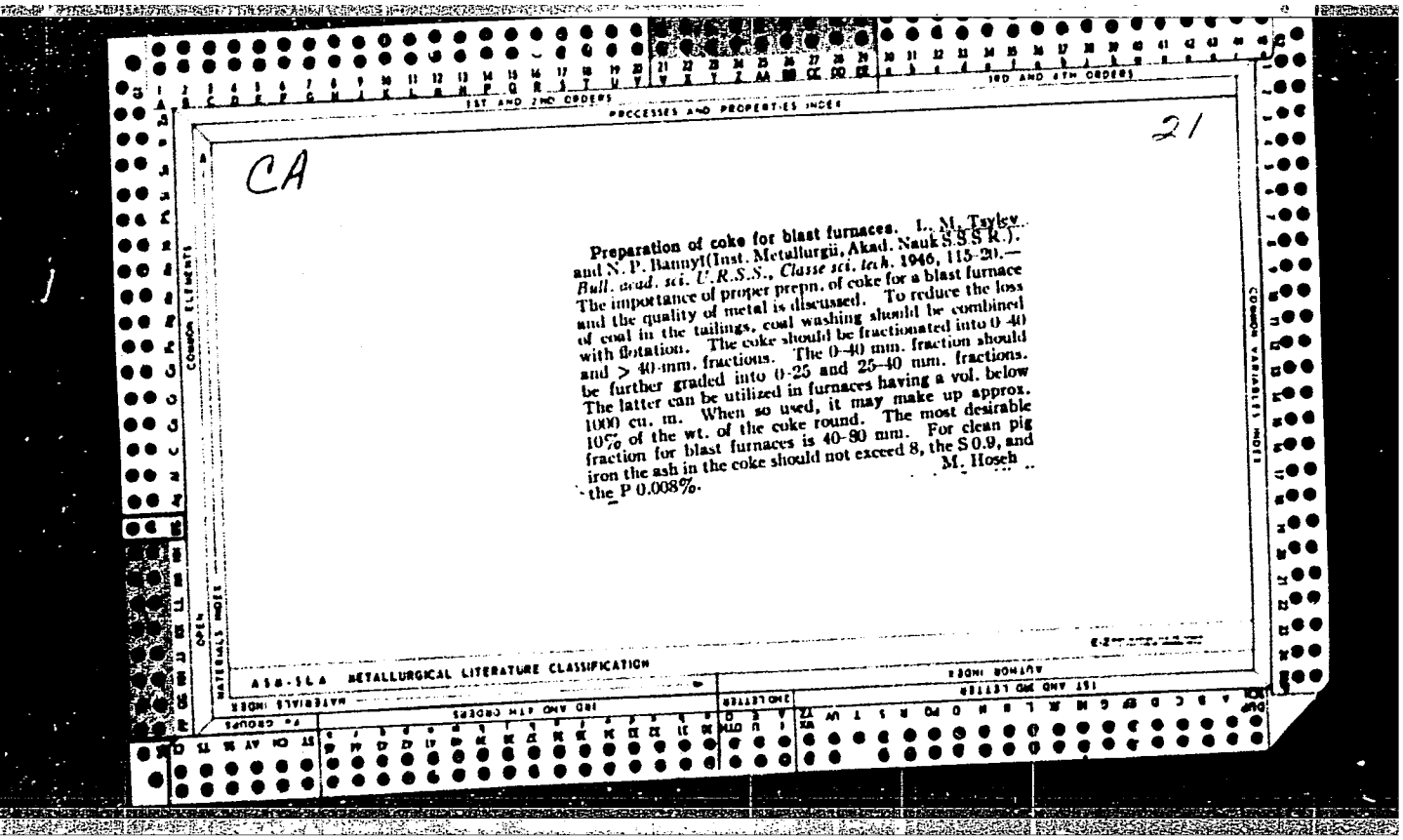
Inst. Metallurgy, AS USSR



CA

7

Production of a self-melting agglomerate of iron ores. L. M. Tsylev and N. P. Bannyi. *Bull. acad. sci. U.R.S.S., Classe sci. tech.* 1945, 1083-7.—The Krivoi Rog ores contain up to 60% of fines smaller than 10 mm. Proper agglomeration greatly improves the performance of the blast furnace. It allows a better contact of the slagging components thereby insuring a smooth run of the furnace; it reduces the vol. of the charge thereby enabling a better utilization of the furnace capacity; it reduces fuel consumption; it raises the CO concn. in the furnace (the CO_2 of the flux is driven out in the agglomeration process); and it reduces the loss of heat in the exhaust gas. The addn. of limestone to the agglomerated ore lowers the FeO content particularly the FeO assocd. with SiO_2. It raises the degree of indirect reduction of Fe ore and this in turn lowers the required quantity of coke. The addn. of limestone should be calcd. so that the ratio CaO.MgO: SiO_2 is 0.70–0.80. Since the limestone used in agglomeration should not exceed 5 mm. diam., it permits the utilization of quarry fines which otherwise are wasted. Care should be taken that the agglomerate contains no free CaO particles. For smelting bessemer pig iron magnesitic limestone should be used. MgO (5-6%) improves the phys. properties of the slag, the latter is more fluid, conserves heat better, and facilitates desulfurization. The use of self-melting agglomerate raises the furnace output by 5% and lowers the consumption of coke by 0.05 and that of limestone by 0.2 units per unit of pig iron. M. Hoseh



CA

21

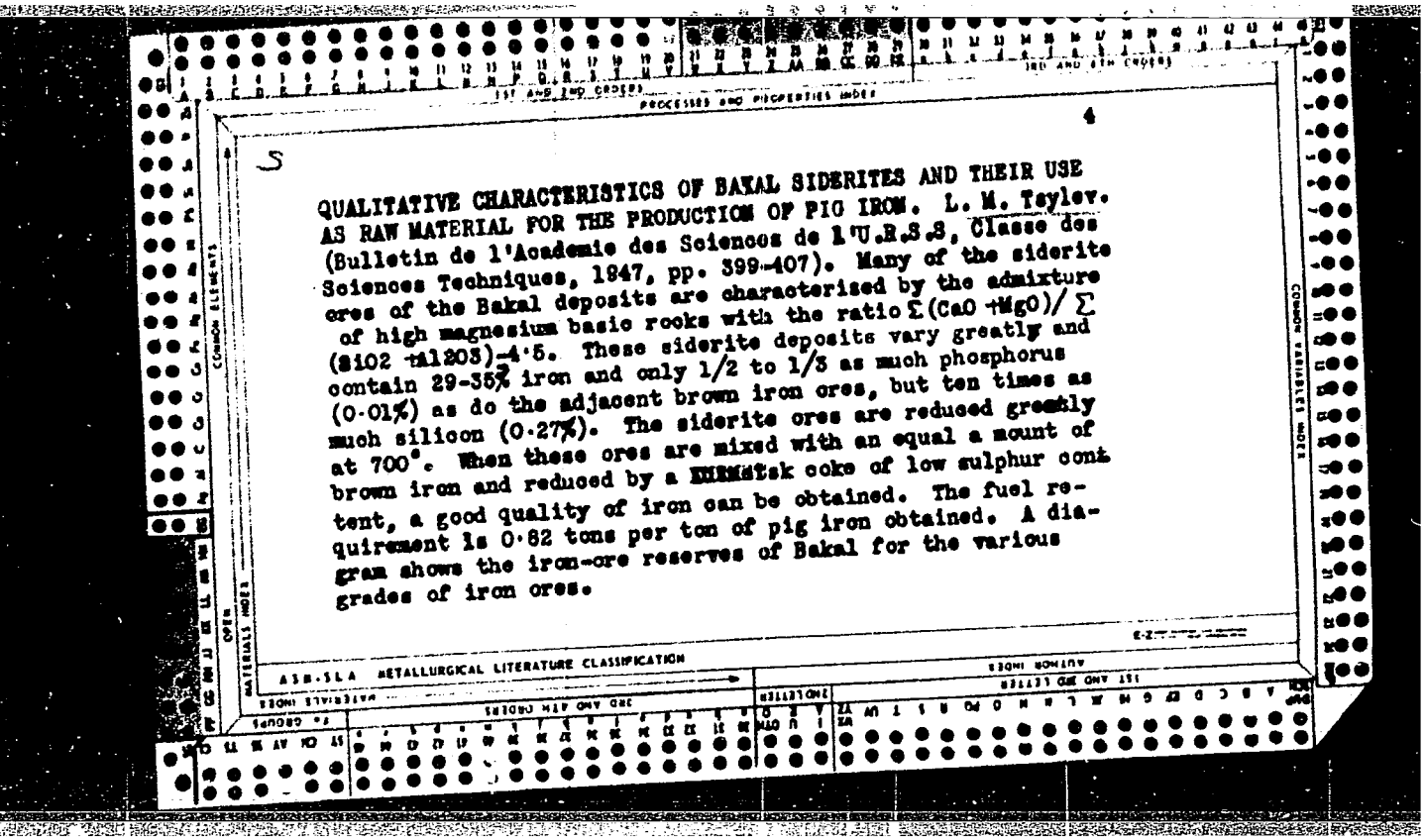
Preparation of coke for blast furnaces. L. M. Tsylev and N. P. Bannyi (Inst. Metallurgii, Akad. Nauk S.S.S.R.). *Bull. acad. sci. U.R.S.S., Classe sci. tech.* 1946, 115–20.—The importance of proper prepn. of coke for a blast furnace and the quality of metal is discussed. To reduce the loss of coal in the tailings, coal washing should be combined with flotation. The coke should be fractionated into 0–40 and > 40-mm. fractions. The 0–40 mm. fraction should be further graded into 0–25 and 25–40 mm. fractions. The latter can be utilized in furnaces having a vol. below 1000 cu. m. When so used, it may make up approx. 10% of the wt. of the coke round. The most desirable fraction for blast furnaces is 40–80 mm. For clean pig iron the ash in the coke should not exceed 8, the S 0.9, and the P 0.008%.

M. Hoseh

TSYLEV, L. M. Dr. Tech. Sci.

Dissertation: "Factors of the Metallurgical Value of Iron and Manganese Ores."
Inst. of Metallurgy, imeni Academician A. A. Baykov, Acad. Sci. USSR, 25 Apr 47.

SO: Vechernyaya Moskva, Apr, 1947 (Project #17836)



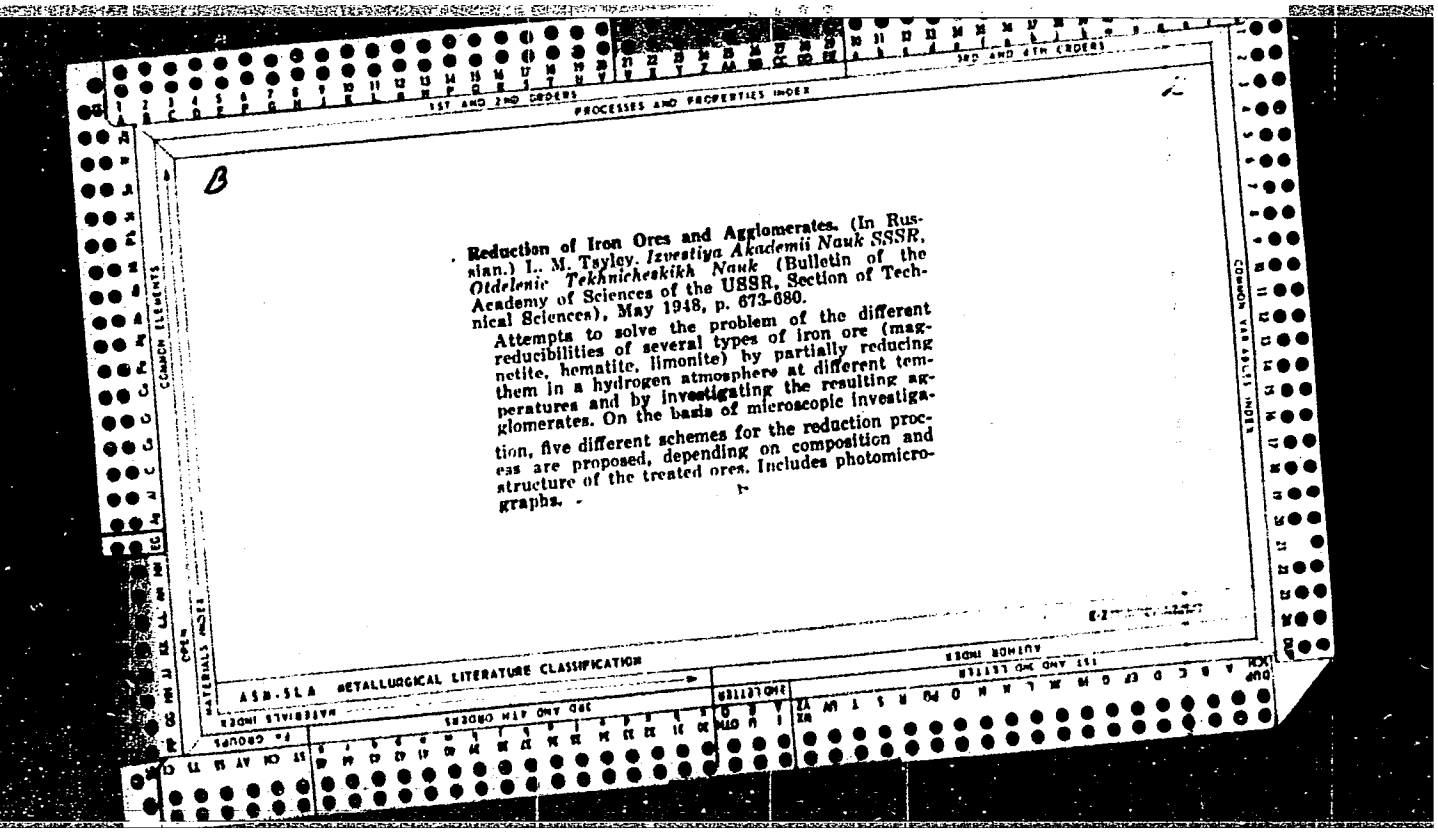
S

4

QUALITATIVE CHARACTERISTICS OF BAKAL SIDERITES AND THEIR USE AS RAW MATERIAL FOR THE PRODUCTION OF PIG IRON. L. M. Teylev. (Bulletin de l'Academie des Sciences de l'U.R.S.S, Classe des Sciences Techniques, 1947, pp. 399-407). Many of the siderite ores of the Bakal deposits are characterised by the admixture of high magnesium basic rocks with the ratio $\Sigma(CaO+MgO)/\Sigma(SiO_2+Al_2O_3)=4\cdot5$. These siderite deposits vary greatly and contain 29-35% iron and only 1/2 to 1/3 as much phosphorus (0·01%) as do the adjacent brown iron ores, but ten times as much silicon (0·27%). The siderite ores are reduced greatly at 700°. When these ores are mixed with an equal a mount of brown iron and reduced by a [illegible]sk coke of low sulphur cont tent, a good quality of iron can be obtained. The fuel requirement is 0·82 tons per ton of pig iron obtained. A diagram shows the iron-ore reserves of Bakal for the various grades of iron ores.

TSYLEV, L. M.

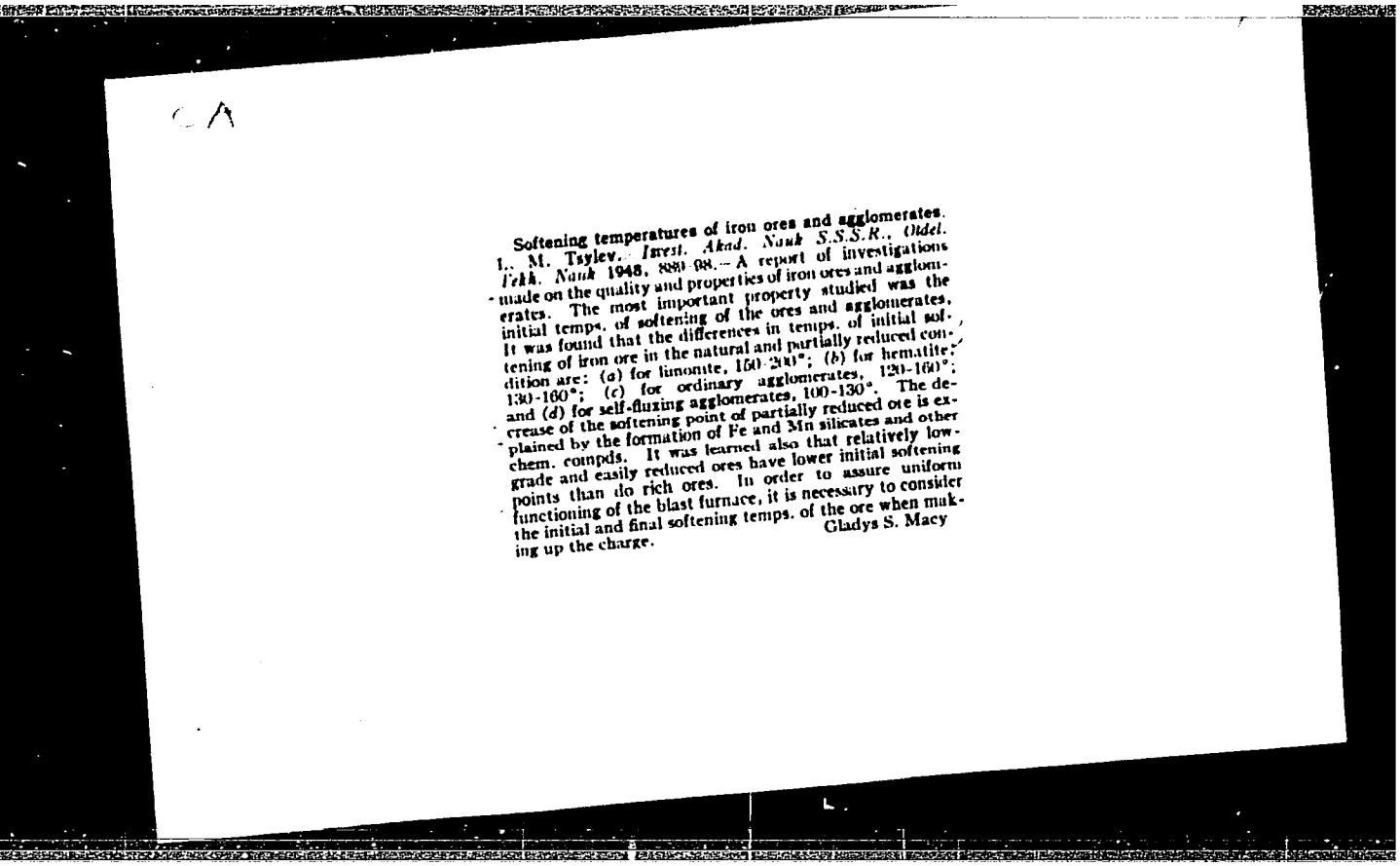
Tagiroy, K. Kh., and Tsylev, L. M., "Requirement of Industry With Respect to the Quality of Mineral Raw Materials." Handbook for geologists, No 59, "Iron Ore," Gosgeologizdat, 1948, 76 pp, 5,000 copies.



B

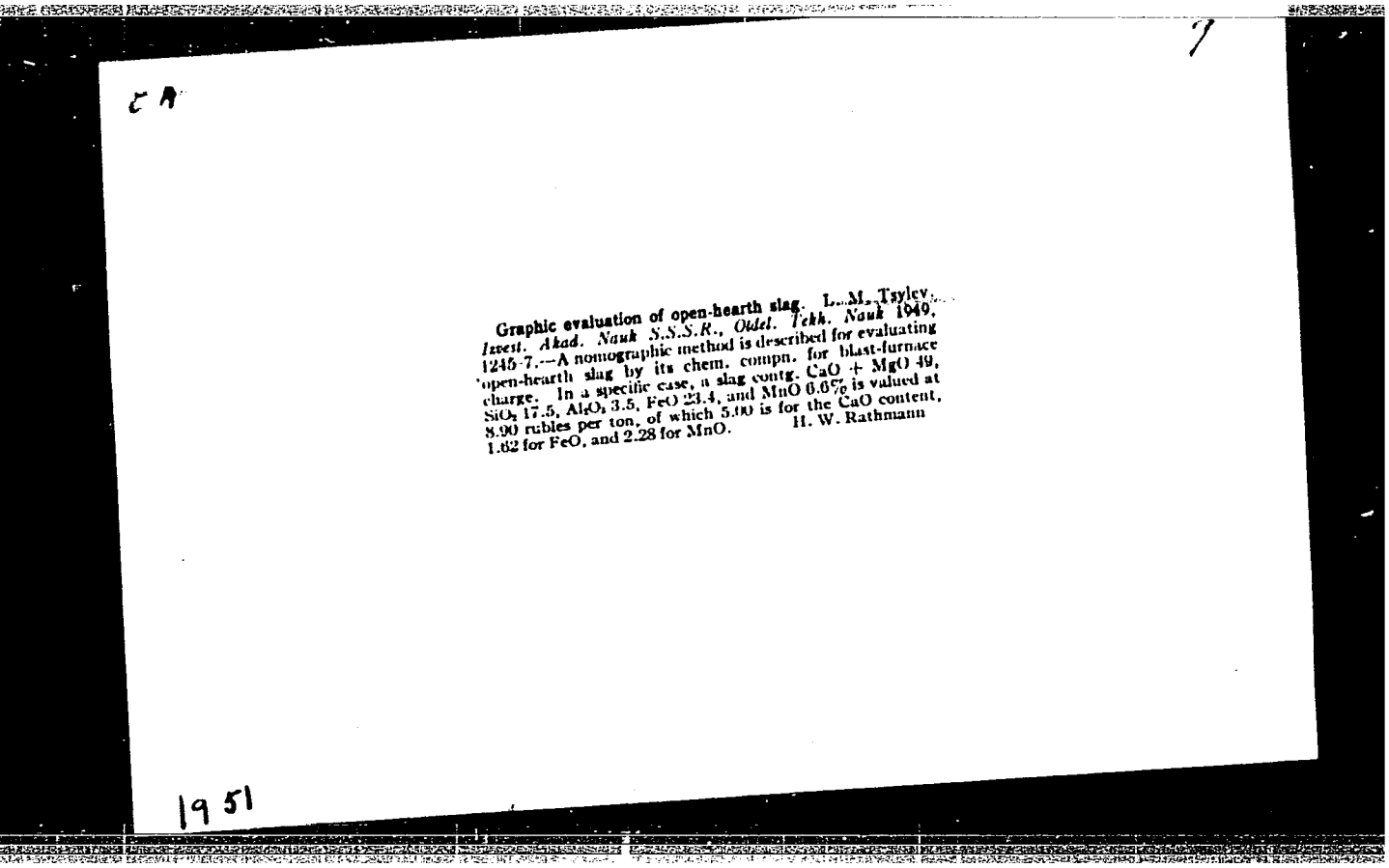
Reduction of Iron Ores and Agglomerates. (In Russian.) L. M. Tsylov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), May 1948, p. 673-680.

Attempts to solve the problem of the different reducibilities of several types of iron ore (magnetite, hematite, limonite) by partially reducing them in a hydrogen atmosphere at different temperatures and by investigating the resulting agglomerates. On the basis of microscopic investigation, five different schemes for the reduction process are proposed, depending on composition and structure of the treated ores. Includes photomicrographs.



Softening temperatures of iron ores and agglomerates. L. M. Tsylev. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1948, 889-98.—A report of investigations made on the quality and properties of iron ores and agglomerates. The most important property studied was the initial temps. of softening of the ores and agglomerates. It was found that the differences in temps. of initial softening of iron ore in the natural and partially reduced condition are: (*a*) for limonite, 150-200°; (*b*) for hematite; 130-160°; (*c*) for ordinary agglomerates, 120-160°; and (*d*) for self-fluxing agglomerates, 100-130°. The decrease of the softening point of partially reduced ore is explained by the formation of Fe and Mn silicates and other chem. compds. It was learned also that relatively low-grade and easily reduced ores have lower initial softening points than do rich ores. In order to assure uniform functioning of the blast furnace, it is necessary to consider the initial and final softening temps. of the ore when making up the charge.

Gladys S. Macy



7

CA

Graphic evaluation of open-hearth slag. L. M. Tsylev. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1949, 1245-7.—A nomographic method is described for evaluating open-hearth slag by its chem. compn. for blast-furnace charge. In a specific case, a slag contg. CaO + MgO 49, SiO_2 17.5, Al_2O_3 3.5, FeO 23.4, and MnO 6.6% is valued at 8.90 rubles per ton, of which 5.00 is for the CaO content, 1.62 for FeO, and 2.28 for MnO. H. W. Rathmann

1951

BARDIN, Ivan Pavlovich, 1883- , akademik; TSYLEV, L.M.; RUDNEVA, A.V.; CHERNYSHEV, A.M.

[Viscosity and mineralogical composition of primary blast-furnace slag] Viazkost' i mineralogicheskii sostav pervichnykh domennykh shlakov. Moskva, Izd-vo Akademii nauk SSSR, 1951. 33 p. (MLRA 6:11)
(Slag)

CA

9

Effect of the concentration of carbon monoxide in the gas on the reducibility of iron ores and agglomerates. L. M. Tsylev (A. A. Baikov Metallurg. Inst. Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1951, 74–0.—Analyses of the ores (Fe_2O_3, FeO, Fe, SiO_2, Al_2O_3, CaO, MgO, MnO, TiO_2, P_2O_5, S, ignition loss) are: martite ore (I), compact, 90.53, —, 63.31, 6.29, 0.90, —, —, 0.11, 0.03, 0.076, 0.04, 0.100; brown hematite (II), porous, 52.02, —, 36.54, 28.26, 7.10, 1.08, —, —, —, —, —, 11.20; martite ore agglomerate (III) 58.90, 25.06, 60.71, 11.80, 1.57, 1.12, 1.91, 0.42, —, 0.022, 0.04, —%. Samples were reduced at temps. from 600 to 1000° in $CO + CO_2 + N_2$ mixts. with both the normal (*a*) and an increased (*b*) CO content; at 600°, (*a*) 32 + 10 + 58, (*b*) 50 + 7 + 43; at 800° (*a*) 34 + 8 + 58, (*b*) 51 + 3 + 43; at 1000° (*a*) 42 + 0 + 58, (*b*) 57 + 0 + 43%. II is most actively reduced at 700–800°; at 700°, the increase of the reducibility through increase of the CO content is 8–12%, at 800°, 5–10%, and at 900°, 5–7%. The rate is max. over the 1st 60 min., then the degree of reduction increases very slowly and finally becomes const. The curves of the degree of reduction as a function of time at 900°, with normal and with increased CO content, are almost parallel. With I, at 600°, increase of the CO content increases the reducibility by 8–12%, at 800° by 7–12%, at 900° by 7.5%, and at 1000° by 8–15%. The gain of reducibility through increase of the CO content at 900° is almost the same as the gain through increase of the temp. from 900 to 1000° at unchanged CO content. With III, the degree of reduction is only 30% at 800°; the gain through increase of the CO content from 34 to 54% is only 4.0–6.5% (in 60 min.). Through increase of the CO content, the time necessary for the reduction is shortened for I at 600–800° by a factor of 1.3–1.4, at 900° by 1.2, and at 1000° by 1.4; for II, by a factor of 1.3–1.4 for III, by a factor of 1.2–1.3. N. Thon

TSYLEV, L.M.

USSR/Metals - Pig Iron, Processes Apr 52

"Change in the Phase Compositon of Molten Materials in the Processes of Slag Formation in Blast Furnaces," Acad I. P. Bardin, A. V. Rudeva, L. M. Tsylev

"Iz Ak Nauk SSSR, Otdel Tekh Nauk" No 4, pp 532-559

Presants results of petrographic investigation of half-reduced ores, slags and agglomerates taken from various levels of blast furnace inprocess of making foundry pig iron. Concludes that optiumu mineralogical compn of primary blast furnace slags must ve characterized by predominance of Ca-Fe and Ca-Mn sillicates with simple structure and by lowest possible content of those Ca silicates and aluminosilicates which increase slag viscosity and have higher mp. Illustrated by a series of micrographs.

219T45

TAYLER, L.M.

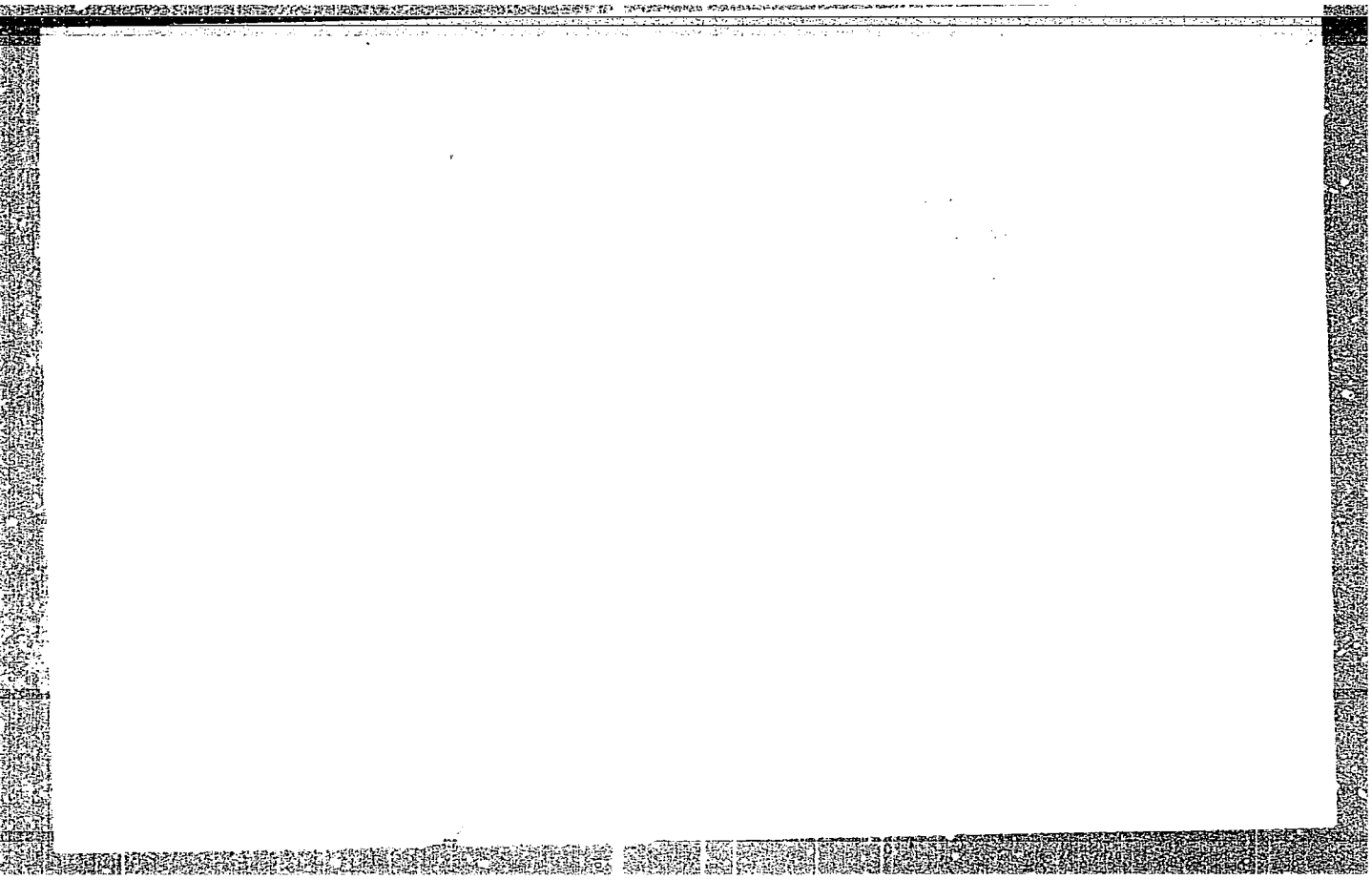
J. of The Iron & Steel Inst.
V-176 Feb 1954
Treatment & Use of Slags

The Mechanism of the Viscosity of Blast-Furnace Slags. A. M. Chernyshev, L. M. Tsylov, and A. V. Rudneva. (*Izvestiya Akademii Nauk S.S.S.R., Otdelenie Tekhnicheskikh Nauk*, 1953, (7), 1044–1057). [In Russian]. On the basis of the ionic theory of slags a theoretical interpretation of changes in the viscosity of slags with changes in their chemical composition is attempted. It is concluded that the viscosity of a homogenous liquid slag is governed mainly by the size of silicate anions : The greater the size of silicate anions and the concentration of large silicate aggregates, the stronger is the interlocking of the individual slag layers. The size of the complex silicate anions depends on the ratio of the number of oxygen atoms to the number of silicon atoms in the slag. The larger this ratio is, the smaller are the silicate aggregates and *vice versa*. Therefore, with increasing concentration in the slag of CaO, MgO, TiO_2, MnO, FeO, and Na_2O, *i.e.*, oxides which do not form complex aggregates in a liquid slag, the viscosity of the slag is decreased because of the increase in the oxygen/silicon ratio.—V. G.

USSR.

The behavior of sulfur in blast furnace gases. I. S. Kulikov and L. M. Faylev. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1954, No. 12, 102–10.—S in the coke burns to SO_2 inside the blast furnace, the lowering of CO_2 [illegible] the gas phase [illegible] of S with the formation of CS, S, S_2, HS, H_2S, and COS. The max. S, CS_2, and COS contents are obtained at 1600, 1400, 1250° and 115[illegible]; while H_2S and COS are higher at lower temps. The FeO and CaO are the most effective absorbents for S in the order given, and the absorptive efficiency [illegible] becomes lower at higher temps. and is increased for CaO. The absorption of S in Fe is reduced by its liquefaction and satn. with C, and the Fe becomes supersatd. with S at the lower horizons, and gives it up to CaO. At equil. conditions S should be completely eliminated from the gas, and its considerable presence in it proves that equil. is not reached at the high temp., and that S is evolved from [illegible] slag. Fe_2O_3 and Fe_3O_4 oxidize S to SO_2. $CaCO_3$ absorbs S effectively, and the CaS formed is unaffected by CO and CO_2, but interacts with Fe_2O_3 with the formation of SO. The formation of $CaSO_4$ is improbable as long as the partial pressure of SO_2 does not exceed 10^{-4}. S in pyrite and FeS can be oxidized to SO_2, which should not be readsorbed near the furnace throat if the temp. there is above 350–400°.

W. M. Sternberg



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FD-2749

USSR/Engineering - Metallurgy Tsylev, L.M.

Card 1/1 Pub 41 - 10/16

Author : Bardin, I. P., Rudneva, A. V., Tsylev, L. M., Moscow

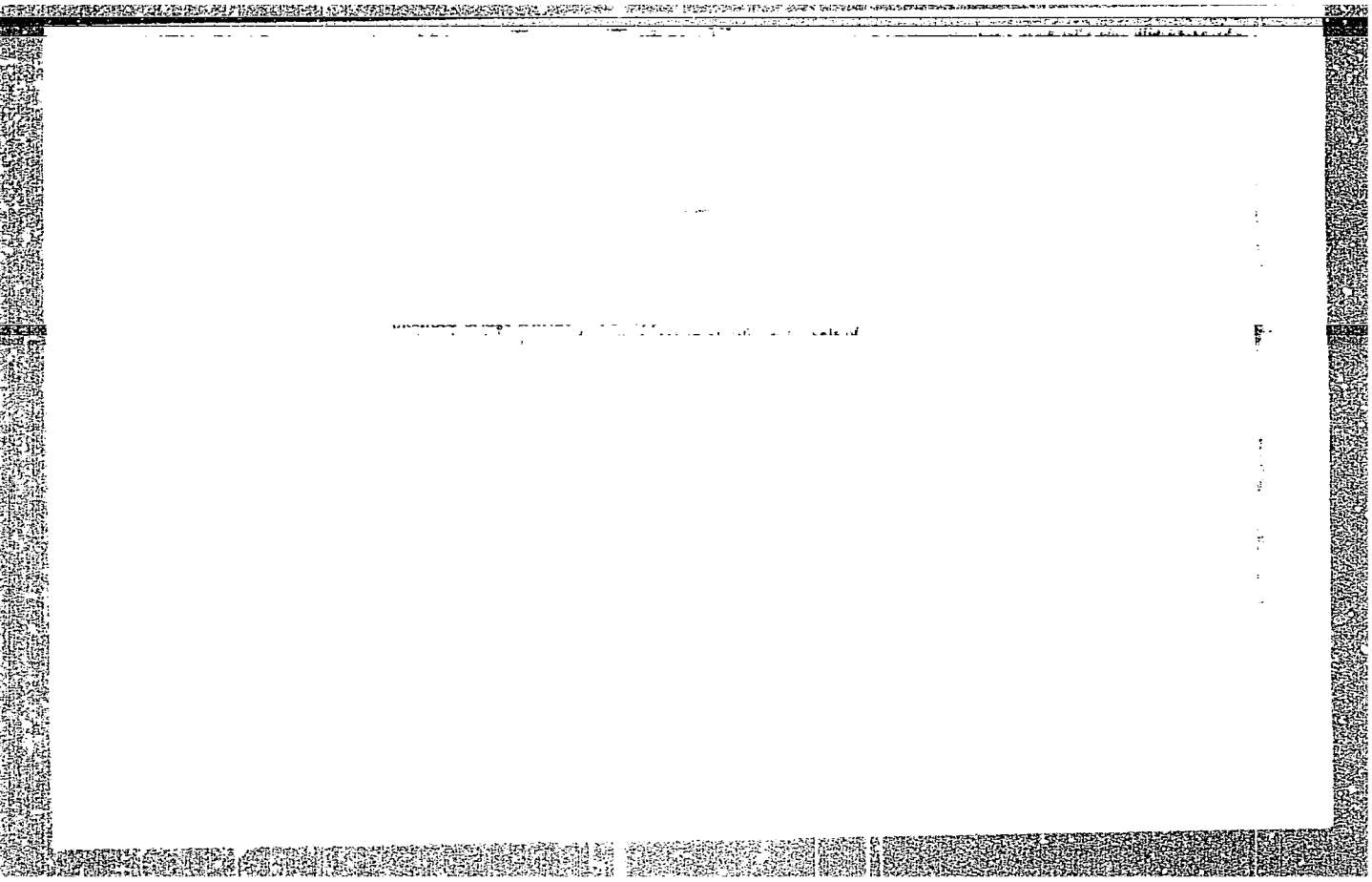
Title : Smelting phases in a blast furnace

Periodical : Izv. AN SSSR, Otd. Tekh. Nauk 5, 123-128, May 1955

Abstract : Deals with temperature ranges within the blast furnace and the solid-plastic-liquid stages of the charge. The point of slag formation is emphasized in relation to the plastic stage, as it is through control of the thickness of this stage, the author claims that heat transmission to the solid stage is effected, and thus also the efficiency of the blast furnace. The author claims it is most desirable to maintain a thin plastic stage for better efficiency, especially with the building of 1300 M^3 blast furnaces now going on in the USSR. Illustrations.

Institution :

Submitted : March 12, 1955



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[illegible]ANOV, A.S.; KULIK, V.[illegible]; [illegible]EV, [illegible].M.

Surface tension and density of [illegible] mel[illegible].
Zhur. fiz. khim. 36 no.[illegible] [illegible]

ZLOBINSKIY, Boris Mikhaylovich; TSYLEV, L.M., professor, doktor tekhnicheskikh nauk, retsenzent; SHAROV, S.I., professor, doktor tekhnicheskikh nauk, retsenzent; AGROSKIN, A.A., professor, doktor tekhnicheskikh nauk, otvetstvennyy redaktor; RYKOV, N.A., redaktor izdatel'stva; NADEINSKAYA, A.A., tekhnicheskiy redaktor

[Brown coal as fuel in metallurgy] Buryi ugl' kak metallurgicheskoe toplivo. Moskva, Ugletekhizdat, 1956. 37 p. (MLRA 9:11)
(Lignite)

SAMARIN, A.M., otvetstvennyy redaktor; TSYLEV, L.M., professor, doktor, redaktor; VOSKOBOYNIKOV, V.G., doktor tekhnicheskikh nauk, redaktor; OSTROUKHOV, M.Ya., kandidat tekhnicheskikh nauk, redaktor; CHERNOV, A.N., redaktor izdatel'stva; KISELEVA, A.A., tekhnicheskiy redaktor

[Investigation of blast furnace processes] Issledovanie domennogo protsessa. Moskva, 1957. 255 p. (MLRA 10:4)

1. Akademiya nauk SSSR. Institut metallurgii.
2. Chlen-korrespondent AN SSSR (for Samarin)
(Blast furnaces)

TSYLEV, L.M., GROMOV, M.I.

"Non-Blast-Furnace Desulphurization of Cast-Iron,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

137-58-4-6322

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 1 (USSR)

AUTHOR: Tsylev, L. M.

TITLE: The Role of M. A. Pavlov, Member of the Academy, in the Development of Domestic Metallurgy (Rol' akademika Pavlova v razvitii otechestvennoy metallurgii)

PERIODICAL: V sb.: Issled. domennogo protsessa, Moscow, AN SSSR, 1957, pp 19-23

ABSTRACT: A detailed description of the scientific and engineering activity of M. A. Pavlov, Member of the Academy, is presented.

1. Metallurgy--USSR

Ye. V.

Card 1/1

TSYLEV, L. M.

137-58-5-8882

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 19 (USSR)

AUTHORS: Mikiashvili, Sh. M., Tsylev, L. M., Samarin, A. M.

TITLE: Fusion Properties of the $MnO-SiO_2-Al_2O_3$ System (Svoystva rasplavov sistemy $MnO-SiO_2-Al_2O_3$)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 423-432. Diskus., pp 505-512

ABSTRACT: Viscosity of slags containing 5-30% Al_2O_3, 10-55% SiO_2, and 20.7-75% MnO was studied; a viscosity diagram for this system was constructed at 1500°C together with its pseudobinary discontinuities at 1400°, 1500°, and 1590°. The most fluid slags (0.5-2 poise at 1500°) are those which contain 18-48% SiO_2, 50-75% MnO, and 0-25% Al_2O_3. Smallest viscosity is exhibited by slags in which the concentration ratio $MnO/Al_2O_3 = 6$ and the SiO_2 content is under 40%. The viscosity of these slags varies very little with temperature. An increase in SiO_2 concentration produces a sharp increase in viscosity. Petrographic investigations revealed that fused slags contain tephroite, rhodonite spessartine, manganosite, galaxite, cristobalite, and glass. The surface tension, σ_1, of low carbon steel and of slags of the sys-

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137-58-5-8832

Fusion Properties of the $MnO-SiO_2-Al_2O_3$ System

tem under investigation was determined by the method photographing a drop lying on a flat surface. Between temperatures of 1500° and 1595° the σ Fe amounts to 1306-1310 dynes/cm. The σ_{slag} becomes greater with increasing MnO content but is reduced by the presence of Al_2O_3 and SiO_2. The σ_{slag} is only slightly affected by temperature and, depending on the composition of the slag, varies between 280 and 670 dynes/cm. The magnitudes of the interphase tension between the slag and Fe were computed by measuring the marginal contact angle between a drop of liquid slag and a drop of liquid Fe, as well as by employing the σ values obtained. The magnitude of the interphase tension varies from 800 to 1160 dynes/cm. Replacing MnO by SiO_2 and Al_2O_3 produces an increase in interphase tension. The results obtained are explained in the light of ionic theory of slags.

I. T.

1. Slags--Viscosity 2. Slags--Properties

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Tsylev, L. M.

137-58-1-2027

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 1, p 275 (USSR)

AUTHORS: Tsylev, L. M., Sokolov, G. A.

TITLE: Measurement of the Viscosity of Fused Slags by Means of an Electroviscosimeter (Izmereniye vyazkosti rasplavlennykh shlakov pri pomoshchi elektroviskozimetra)

PERIODICAL: Tr. In-ta metallurgii, AN SSSR, 1957, Nr 1 pp 33-38

ABSTRACT: The viscosimeter consists of a DC motor, to the armature of which a Mo spindle equipped with a head is attached. On immersing the head into slag of 150-200 poises viscosity, the rate of rotation of the armature drops from 7-8 to 2-3 rps, leading to a change in the current passing through it, which is measured by means of a measuring bridge. The instrument is calibrated for castor oil, boric anhydride, and borax. A 36-g sample of slag is fused in graphite or technically pure Fe crucibles, the latter being used in the case of ferrous slags. The diameter of the crucible is 22 mm and the diameter of the spindle head is 10 mm. The head is immersed 10 mm below the level of the slag surface. The temperature is measured by a Pt/Pt-Rh thermocouple placed in another compartment of the crucible 10 mm in

137-58-1-2027

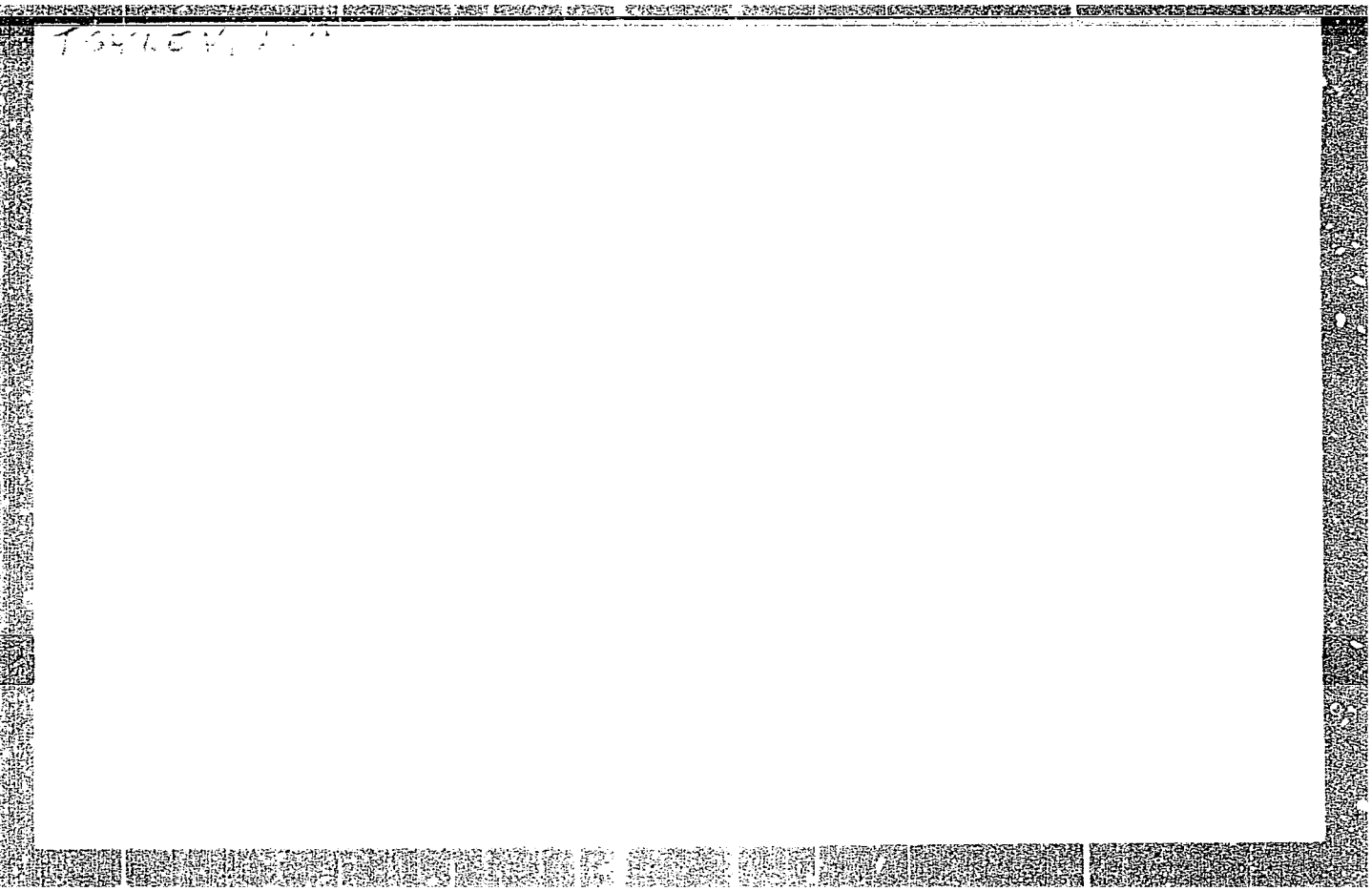
Measurement of the Viscosity of Fused Slags (cont.)

diameter. The slags are fused in an N_2 atmosphere. Data are presented on the measurement of the viscosity of 3 slags with basicities of 0.65-1.08 in the 1250-1600°C temperature interval. At 1500°, the viscosity of the slags was 5-15 poises. The measurement for each slag lasted about 1.5 hour.

G. G.

1. Slags--Viscosity measurement 2. Electroviscosimeters--Applications

Card 2/2



APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757310019-7"

Tsylev, L.M.

137-1958-2-2393

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 27 (USSR)

AUTHORS: Bardin, I.P., Tsylev, L.M., Ostroukhov, M.Ya., Khodak, L.Z.

TITLE: On the Process of Coke Combustion at the Tuyeres of a Blast Furnace (O protsesse goreniya koksa u furm domennoy pechi)

PERIODICAL: Tr. In-ta metallurgii AN SSSR, 1957, Nr 2, pp 3-8

ABSTRACT: In 1954-55, in different regions of the Soviet Union, a study was made on six blast furnaces having effective volumes of 330--1386 m^3. Gas samples were taken along the axis and above and below tha axis of a tuyere. The diagram depicting the change in gas composition in the combustion zone differed markedly from the "classical diagram." From the path of the isorithmic lines for CO_2, CO, and O_2 in a vertical plane it was possible to establish the direction of the blast and the pattern of circulation of the coke particles. These experiments led to the conclusion that combustion of the coke does not occur in the bed layer but inside the blast. In addition, the focal combustion zone was found to be distributed along a spherical surface nearly at the boundary of the combustion zone. The length of the oxidation zone was determined basically by the kinetic energy of the blast and did not depend appreciably on other factors. G.Ch.

Card 1/1

1. Coke--Combustion 2. Blast furnaces--Applications

137-58-4-6574

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 37 (USSR)

AUTHORS: Bardin, I.P., Tsylev, L.M., Mikiashvili, Sh.M.

TITLE: The Viscosity of Synthetic High-alumina Blast-furnace Slags (Vyazkost' sinteticheskikh vysokoglinozemistykh domennykh shlakov)

PERIODICAL: Tr. in-ta metallurgii AN SSSR, 1957, Nr 2, pp 9-13

ABSTRACT: A rotary viscosimeter (Tsylev, L.M., Popov, I.A., Zavodsk. laboratoriya, 1951, Nr 5, p 594) was employed to investigate slags of five different chemical groups (18 slags in all). (MgO) in the slags of Groups I, II and III was constant 5, 10 and 14% respectively. (MgO) and (Al_2O_3) were constant in the slags of Groups IV and V: 5 and 28%, repectively, in IV and 5 and 26% in V. The basicity of the(CaO/SiO_2) in these slags was in the 0.595-1.30 range. It was established that MgO reduces the m.p. of the slags under investigation, while an increase in basicity increases it and significantly reduces the temperature interval within which the slags will crystallize. Substitution of MgO for CaO reduces the m.p., and this, it is hypothesized, explains the reduction in the amount of refract-

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137-58-4-6574

The Viscosity of Synthetic High-Alumina Blast-furnace Slags

ory minerals forming upon the crystallization of the slags: larnite $2CaO \cdot SiO_2$ (2130°), and itelenite $2CaO \cdot Al_2O_3 \ SiO_2$(1590°). On the basis of the work done, the following is the composition of the slags recommended for blast furnace operations: MgO 14% and CaO/SiO_2= 0.815 (III), and the slags of the IV and V groups with CaO/SiO_2 basicities of 0.81 and 0.70 respectively. These slags are of low viscosity and have a wider temperature interval of crystallization. The viscosities of the slags investigated are presented in tables and graphs. A broader investigation, involving petrographic analysis, is required to provide a clearer picture for the determination of the optimal composition of slag for the blast-furnace process.

A. R.

1. Slags--Viscosity 2. Blast furnaces--Applications

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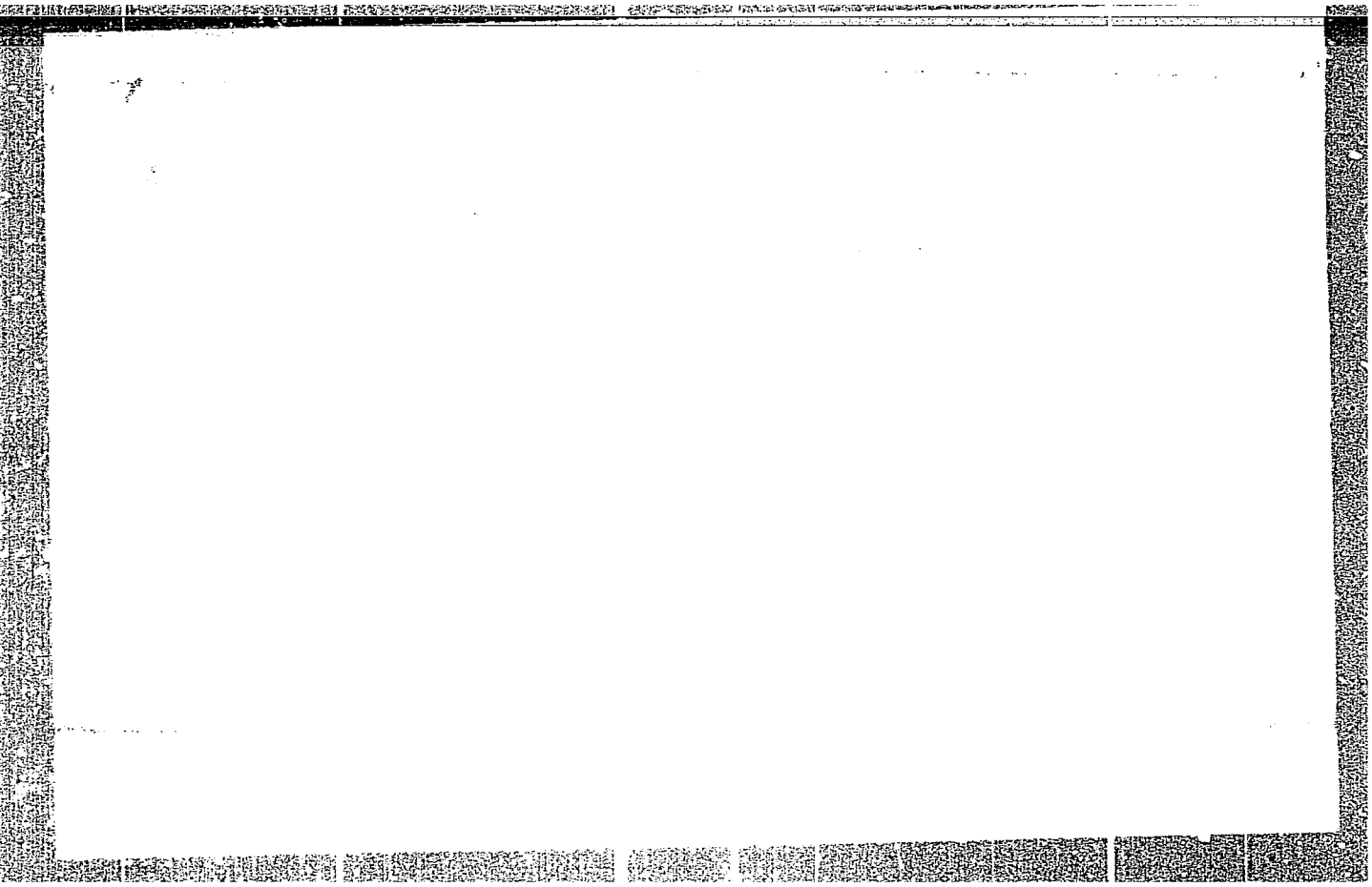

Tsylev, L.M.

AUTHORS: Mikiashvili, Sh. M., Samarin, A.M. and Tsylev, L.M. (Moscow).

24-4-8/34

TITLE: Interphase tension at the boundary slag-iron and surface tension of melts of the system $MnO-SiO_2-Al_2O_3$.

(Mezhfaznoye natyazheniye na granitse shlak-zhelezo i poverkhnostnoye natyazheniye rasplavov sistemy zakis' margantsa-kremnezem-glinozem).

PERIODICAL: "Izv. Ak. Nauk, Otd. Tekh. Nauk" (Bulletin of the Ac. Sc., Technical Sciences Section) 1957, No.4, pp.54-62 (USSR).

ABSTRACT: Popel, S.I., Esin, O.A. and Gel'd, P.V. (Dokl. Ak. Nauk, Vol.74, p.75, 1950) developed a method of direct determination of the interphase tension based on measuring the dimensions of the liquid drop of the metal in the slag by means of X-rays, since according to these authors calculation of the interphase tension at the surface of division of two liquid phases on the basis of the difference in the surface tension of these phases does not give reliable results for the system iron-slag. However, the use of the method of these authors is limited, due to the difficulty of selection of a refractory material for the crucible which is equally resistant to the chemical effects of the slag and the iron. The method of measurement of the interphase tension on the basis of the dimensions of the solidified metal drop in the slag yields very inaccurate results due to the appreciable deformation of the drop during the

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Interphase tension at the boundary slag-iron and surface tension of melts of the system $MnO-SiO_2-Al_2O_3$. (Cont.)

process of solidification (Leont'eva, A.A. "Kolloidnyi Zhurnal", No.11, 1949). The method used by the authors of this paper is based on determining experimentally the boundary angle θ of the melt drop at the surface of the liquid iron (see Fig.1) by means of the test set-up as shown in Fig.2; a graphite heated furnace of 45 mm inner dia., a corundum crucible of 40 mm dia. and 2.5 to 3 mm depth containing technically pure iron is placed on a magnesite base. After melting the iron a drop of the studied slag is fed onto the iron surface by means of a specially designed graphite tube (Fig.3). The determined values of the boundary contact angles for various slag compositions at temperatures of 1510 to 1540 C are given in Table 2. The determined surface tension values for various slag compositions of the system $MnO-SiO_2Al_2O_3$ are enumerated in Table 3. The graph, Fig.7, gives the interphase tension at the surface of sub-division of the melts of the system $MnO-SiO_2-Al_2O_3$ and the liquid iron, whilst the graphs, Fig.8, show the influence of substitution of silica for MnO on the interphase tension. It was found that substitution of MnO by silica leads to a considerable reduction of the surface tension; the silica is surface active at the boundary melt-gas. Addition of Al_2O_3 to the melts brings about, in the case of a constant

Interphase tension at the boundary slag-iron and surface tension of melts of the system $MnO-SiO_2-Al_2O_3$. (Cont.)

$MnO:SiO_2$ ratio, some increase in the surface tension which also increases in the case of a constant MnO content. The temperature has little effect on the surface tension of the melts. From the obtained values of the surface tension of the phases and of the boundary contact angle, the values of the interphase tension at the boundary of the slag melts with the liquid iron were determined. Substitution of MnO by silica leads to a considerable increase of the inter-phase tension which also increases if the MnO is substituted by Al_2O_3. MnO appears to be surface active at the boundary iron-slag melt. A certain reduction of the interphase tension was observed in the case of substitution of silica by alumina. Addition of alumina into the melt in the case of a constant $MnO:SiO_2$ ratio brings about an increase of the interphase tension. There are 8 figures, 3 tables, 10 references, all of which are Russian.

Card 3/3

SUBMITTED: May 3, 1956.

AVAILABLE:

CHIZHEVSKIY, Nikolay Prokop'yevich, akademik; KUSAKIN, N.D., kand.tekhn. nauk, sostavitel' toma; BARDIN, I.P., akademik; SAMARIN, A.M.; SYSKOV, K.I., doktor tekhn.nauk; TSYLEV, doktor tekhn.nauk; CHERNYSHEV, D.M., red. izd-va; PRUSAKOVA, T.A., tekhn.red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad. nauk SSSR. Vol.2. 1958. 425 p. (MIRA 12:1)

1. Chlen-korrespondent AN SSSR (for Samarin).
(Coke) (Metallurgy)

CHIZHEVSKIY, Nikolay Prokop'yevich, akad.; KUSAKIN, N.D., kand. tekhn. nauk,; BARDIN, I.P., akad., otv. red.; SAMARIN, A.M., red. SYSKOV, K.I., doktor tekhn. nauk, red.; TSYLEV, L.M., doktor tekhn. nauk, red.; SHAPOVALOV, I.K., red. izd-va,; PRUSAKOVA, T.A., tekhn. red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad. nauk SSSR. Vol. 1. 1958. 439 p. (MIRA 11:11)

1. Chlen-korrespondent AN SSSR(for Samarin)
(Metallurgy)
(Coke)
(Fuel)

TSY[illegible]EV, L. M.

18(0) PHASE I BOOK EXPLOITATION SOV/1728

Akademiya nauk SSSR. Institut metallurgii

Sovremennyye problemy metallurgii (Modern Problems in Metallurgy) Moscow, Izd-vo AN SSSR, 1958. 640 p. 3,000 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Eds. of Publishing House: V.S. Rzhevnikov, and A.N. Dernov; Tech. Ed.: T.V. Polyakova.

PURPOSE: This book is intended for scientific and technical personnel in the field of metallurgy.

COVERAGE: This is a collection of articles on certain aspects of Soviet metallurgy. The book is dedicated to Academician Ivan Pavlovich Bardin on the occasion of his 75th birthday. The book is divided into seven parts. The first part consists of two articles presenting a brief account of the biography and professional activity of the Soviet metallurgist. It includes an article by John Chipman, Nicholas Grant, and John Elliott (M.I.T., USA) describing their meeting with Bardin in Moscow and also his visit to the United States. The second part consists of three articles and deals with raw materials and fuels for the Soviet metallurgical industry. The third part represents the major portion of the book. It consists of 25 articles dealing with the various aspects of the metallurgy of pig iron and steel. The fourth part consists of two articles treating the metallurgy of nonferrous metals. The fifth part consists of three articles on the forming of metals. The sixth part consists of eight articles discussing certain aspects of physical metallurgy. The last part deals with general problems in the field of metallurgy. References are given after each article. No personalities are mentioned.

TABLE OF CONTENTS:

Modern Problems in Metallurgy SOV/1728

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TSYLEV, L.M.

.25(5) PHASE I BOOK EXPLOITATION SOV/1497

Akademiya nauk SSSR. Institut nauchnoy i tekhnicheskoy informatsii

Metallurgiya SSSR, 1917-1957, t. 1 (Metallurgy of the USSR, 1917 - 1957, Vol. 1) Moscow, Metallurgizdat, 1958. 745 p. 3,000 copies printed.

Ed. (Title page): I. P. Bardin, Academician; Ed. (Inside book): G. V. Popova; Tech. Ed.: O. G. Bekker.

PURPOSE: The book is intended for scientific workers and engineers in metallurgical plants and in the machine-building industry. It may also be used by students in advanced courses in metallurgical vuzes.

COVERAGE: This collection of articles covers extensively practical and theoretical developments in Soviet metallurgy during the last 40 years. The material deals with the discovery and development of the major ore deposits and the growth of the metal industry in various parts of European and Asiatic USSR. Research institutes, laboratories, their location, and the names of the scientists and engineers involved are listed. Many papers contain so many references and names of various personalities that it was considered beyond the scope of the coverage of each article to list them. The authors claim that the processes,

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methods and theories described in this book reflect the most recent developments in Soviet metallurgy.

TABLE OF CONTENTS:

Metallurgy of the USSR (Cont.) SOV/1497

Dvorin, S. S. Coke and Chemical Industry in the USSR 61

The article gives the geographical location of coke plants and production figures from 1913 to 1955. The rate of development and the chemicals produced are listed.

Tsylev, L.M., and N.K. Leonidov. Development of Blast Furnace Production in USSR 86

The authors describe the increase of cast iron production from 1913 to 1956. As a result of intensive geological exploration new deposits of iron have been discovered in different parts of the USSR (locations given). A table lists the amount of pig iron and manganese produced. The article deals with the following subjects: fuel, design of blast furnaces and auxiliaries, dimensions of blast furnaces, loading arrangements, removal of iron and slag, air-blow installations, air-heating arrangements, gas cleaners, miscellaneous equipment, design features, and the last chapter discusses in detail the means of boosting production of pig iron. There are 21 Soviet references.

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Tsylev, L.M.

130-3-2/21

AUTHORS: Gromov, M. I., Tsylev, L.M., Kakunin, A.M., Kotov, V.I. and Kaporulin, V. N.

TITLE: Desulphurization of pig iron outside the blast furnace. (Vnedomennoye obesserivaniye chuguna).

PERIODICAL: Metallurg, 1958, No.3, pp.3-6 (USSR).

ABSTRACT: The authors give diagrams (Fig.1) to show the various methods tried in the USSR and abroad for the external desulphurization of pig iron with soda, calcium carbide or other solid reagents. They suggest that their comparative neglect is due mainly to their relative inefficiency and low productivity. The French IRSID method they criticize on the additional grounds that it would be difficult to effect on a large scale, that special arrangements would be required for trapping the lime dust produced, that the finely divided reagent would be difficult to obtain and that nitrogen is not available at many works. They go on to describe a method developed at the Novo-Lipetskiy metallurgical works in which the liquid metal is treated with lime in a rotating vessel, coke being added to maintain a reducing atmosphere. B. Provotorov, A. Nikitin and L. Sidorin participated in this work. Experiments

Card 1/3

Desulphurization of pig iron outside the blast furnace.

showed that the desulphurization process is affected by the fluidity of the metal, the quantities of solids added per unit weight of metal, the sizing of the solids and the speed of rotation of the vessel. The internal diameter of the experimental vessels (Fig.2) was 1050 mm and the length of the cylindrical part 1240 mm; one end was conical. With chrome-magnesite lining no build-up of slag on the walls or chemical disruption of the lining occurred. With speeds of rotation of 2.5 and 4.4 m/sec the sulphur content of the metal fell from 0.085 to 0.03-0.012%. The authors give a nomogram for determining the optimal speeds of rotation in relation to the viscosity of the metal and the vessel diameter, and this shows that the optimal speed for the experimental conditions was 9-10 m/sec which would have given more rapid desulphurization. The method is recommended to other works, the following being given as optimal conditions: lime with a minimal content of silica and carbon dioxide, under 1 mm in particle size and added in a quantity of 1% by weight of the iron; coke of particle size 1-3 mm to be added in a quantity of 0.3-0.5% of the weight of the iron; the entrance of slag or runner sand

Desulphurization of pig iron outside the blast furnace. 130-3-2/21

into the vessel and the formation of encrustations on the lining to be prevented. An editorial note says that the Gipromez organization is designing a 100-ton capacity vessel.
There are three figures.

ASSOCIATION: **Institut metallurgii AN SSSR i Novo-Lipetskiy metallurgicheskiy zavod (Institute of Metallurgy AS USSR and the New-Lipetsk Metallurgical Plant.**

AVAILABLE: Library of Congress.

Card 3/3

TSYLEV, L.M.; ZHILO, N.L.; SOKOLOV, G.A.

Viscosity of primary and final blast furnace foundry and converter iron slags. Trudy Inst.met. no.3:35-51 '58. (MIRA 12:3)
(Slag--Testing) (Viscosity)

GUBIN, G.V.; TSYLEV, L.M.

Reduction of ore and coal granules. Trudy Inst.met. no.3:63-68 '58. (MIRA 12:3)

(Sintering) (Oxidation-reduction reaction)

TSYLEV, L.M.

24-58-3-10/38

AUTHORS: Kholzakov, V.I. and Tsylev, L.M. (Moscow)

TITLE: Influence of the Action of Zinc on the Refractory Lining of Blast Furnaces (Vliyaniye vozdeystviya tsinka na ogneupornuyu kladku domennykh pechey)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 3, pp 89-95(USSR)

ABSTRACT: A number of hypotheses exist on the causes of disruption and growth of refractory linings of blast furnaces in the case of presence of zinc and these are based on the following phenomena: (1) the difference between the coefficients of expansion of the zinc and the fireclay is very large, the ratio being 6:1; (2) crystallization of zinc oxide in the top part of the shaft lining; (3) separation of carbon black and of zinc oxide in the lining due to the simultaneous effect of the reactions of oxidation of the zinc and of decomposition of the carbon monoxide; (4) oxidation of the zinc earlier deposited in the lining. Views based on the first and the second of the enumerated phenomena have not been confirmed by the investigations at all. As regards the third-mentioned phenomenon, experimental results obtained by Strashnikov and his team (Refs.1, 2) are available. On the basis of laboratory investigations he arrived at the conclusion that neither

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Influence of the Action of Zinc on the Refractory Lining of Blast Furnaces.

zinc nor zinc oxide do by themselves bring about failure of the refractory lining and that the failure takes place as a result of separation in the lining of carbon black and of zinc oxide, causing the formation of cracks which are filled up by zinc oxide and bringing about increase in the volume of the lining. Hartmann (Ref.3), Feldmann (Ref.4) and Zagyanskiy (Ref.5) attribute the failure to the oxidation of zinc which became deposited earlier in the lining. In practice this assumption was proved only by Hartmann. However, he did not reproduce conditions existing inside the blast furnace and therefore his results cannot be considered as a proof that this process of disruption of the lining does really take place inside the blast furnace. The disruption and growth of the lining of blast furnaces of the Kuznetskiy and Nizhe-Tagil'skiy Works between 1939 and 1945 is briefly described. On the suggestion of Academician I. P. Bardin, carbon blocks were placed into the lining at three horizons during a capital overhaul in April, 1953 and from these

Influence of the Action of Zinc on the Refractory Lining of Blast Furnaces.

specimens were taken at various locations of the same horizon. Analysis of the specimens showed a high zinc content in the carbon blocks which is attributed to the high degree of porosity of these blocks. In 1956, the bottom part of the shaft of a blast furnace in the Novo-Tagil'skiy Works was made of carbon blocks. According to the observations of A. A. Voznesenskiy and V. M. Minkin, the deformations and the fractures of blast furnace jackets in the blast furnaces of the Kuznetskiy Works are due, to a certain extent, to the formation in the shaft and the body of ferrous incrustations, which occurs particularly frequently during changing over of blast furnaces from open-hearth pig to foundry pig and vice versa. The influence of this factor manifested itself particularly clearly in one blast furnace, where it was established that the sections suffering intensive disruption of the jacket are not those where there is a maximum accumulation of zinc in the lining but where the incrustation is most intensive. To elucidate the mechanism of the influence of zinc on the failure of the lining, the authors of this paper carried out investigations under laboratory conditions. These showed that one of the main causes of disruption and

24-58-3-10/38

Influence of the Action of Zinc on the Refractory Lining of Blast Furnaces.

growth of linings of blast furnaces operating with zinc-containing ores is the formation of an iron-zinc alloy with an iron content of 4 to 20%. An alloy containing 4 to 20% Fe can form, under conditions of contact of metallic zinc with the iron, incrustations at temperatures between 650 and 800°C. Such an alloy acts as a catalyst of the reaction involving decomposition of the carbon monoxide and the separated out carbon black brings about disruption of the lining. There are 5 figures and 10 references, 5 of which are Soviet, 4 German and 1 English.

SUBMITTED: May 28, 1957.

1. Refractory materials 2. Zinc--Effects 3. Blast--Furnaces

Card 4/4

Tsylev, L.M.

18(5) P.3 PHASE I BOOK EXPLOITATION SOV/2812

Akademiya nauk SSSR. Institut metallurgii

Vyplavka ferrosplavov v domennoy pechi na dut'ye, obogashchennom kislorodom (Blast Furnace Production of Ferroalloys With Oxygen-enriched Blast) Moscow, Izd-vo AN SSSR, 1959. 142 p. Errata slip inserted. 2,700 copies printed.

Sponsoring Agency: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii.

Resp. Ed.: L. M. Tsylev, Doctor of Technical Sciences, Professor; Ed. of Publishing House: A. N. Chernov; Tech. Ed.: Yu. V. Rylina.

PURPOSE: This collection of articles is intended for scientific and industrial personnel working on the introduction of intensified blast-furnace production of ferroalloys. It may also be useful to students of institutions of higher technical education.

COVERAGE: The articles in this collection present the results of investigations of blast furnace processes in the experimental production of ferroalloys, conducted at the Novo-Tul'skiy metallurgicheskiy zavod (Novo-Tul'skiy Metallurgical Plant). The

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first article discusses recent achievements in the production of ferroalloys in the Soviet Union. The other articles are concerned with such specific questions as the effect of oxygen-enriched blast on coke consumption, the connection between bridging of the charge and slag composition, analysis of reduction processes, slag formation, and viscosity of blast furnace slags. On the basis of mineralogical study of materials, conclusions are drawn concerning the limits of distribution of solid, plastic, and liquid phases of materials at points along the height of the blast furnace shaft. The effect of the composition of charge materials and melting conditions on the nature of phase transformations is established. Measures are discussed for reducing dust losses and improving conditions for cleaning waste gas in the blast furnace production of ferroalloys. No personalities are mentioned. References follow each article.

TABLE OF CONTENTS:

According to the author, extensive tests showed the use of the oxygen-enriched blast to be very effective. Productivity of the furnace was increased 95 percent for ferromanganese and 53 percent for ferrosilicon. Consumption of coke was reduced by 290 kg. for each ton of ferromanganese produced, and by 200 kg. per ton of ferrosilicon (in comparison with figures for a furnace at an unidentified plant). The tests also demonstrated the feasibility of making silicomanganese in this

Blast Furnace Production (Cont.)

manner. Possibilities are said to exist for reducing the cost of oxygen by building high-output oxygen stations with steam-driven air compressors.

Gess-de-Kal've, B. A. Measures for Reducing Dust Losses and for Improving Conditions for Cleaning Waste Gas in the Blast Furnace Production of Ferroalloys 117

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SOV/180-59-1-7/29

AUTHORS: Ostroukhov, M.Ya., Rudneva, A.V. and Tsylev, L.M. (Moscow)

TITLE: The State of Slag-Forming Materials in the Blast Furnace Oxidizing Zone (O sostoyanii shlakoobrazuyushchikh materialov v okislitel'noy zone domennoy pechi)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 1, pp 37-43 (USSR)

ABSTRACT: The authors point out that most of the comparatively few investigations (Refs 1-6) in which samples of liquids were taken from the blast-furnace hearth relate to furnaces working without raceways in front of the tuyeres. They describe their own investigation which had the aim of studying the behaviour of slag-forming materials under the conditions of present operation, characterised by raceways with their associated strongly oxidizing zones. The work was carried out at the imeni Dzerzhinskogo (Dzerzhinskiy) works with the participation of A.A. Krivosheyev and I.G. Polovchenko of the Central Works Laboratory. The furnace on which the trials were carried out had a hearth diameter of 8.2 m and sixteen 180 mm diameter tuyeres. The burden consisted of 30% raw Krivoy-Rog ore (grades 25 and 34) and 70% fluxed sinter of two basicities (0.25 and

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The State of Slag-Forming Materials in the Blast-Furnace Oxidizing Zone

0.5-0.55), the first containing some manganese. The blast temperature and volume were 450-600°C and 3000-3300 m^3/min, respectively. Pig-iron containing 0.4-0.7% Si, 1.7-2.5% Mn, 0.01-0.05% S, 0.08-0.1% P was smelted with a slag basicity (CaO : SiO_2) of 1.15 - 1.25. At times furnace working was uneven. Gas and material samples were taken at 200 mm intervals along a hearth radius with a 60 mm diameter water-cooled tube. The materials solidifying in the tube were drilled out, separated from pig-iron nodules and the portions corresponding to given sampling points were mixed. Larger (50-100 g) samples were subjected to complete chemical analysis, smaller ones were analysed for metallic iron, FeO and Fe_2O_3. The results of gas sampling are given in Fig 1, which shows composition against distance (mm) from nose of tuyere: the oxygen content falls to 2% at a distance of 1450 mm, CO_2 disappears at 1600 mm and the O_2 : N_2 ratio falls over the first 800 mm and then rises. The iron-oxide content of the slag-forming materials and the iron content of the oxides are shown in Fig 2 as functions of distance. A high CaO : SiO_2 ratio was found in the oxidizing zone, indicating that coke ash

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does not participate in slag formation there. The manganese content of iron samples taken from the oxidizing zone is below that of the pig iron (Fig 3 shows manganese content against distance from the nose of the tuyeres). A detailed petrological examination of samples (Figs 4-9) indicated that part of the slag-forming materials are in the solid or plastic states in the oxidizing zone, consisting of sintered particles of iron oxide, lime and reoxidized iron sponge as well as droplets of iron and slag frozen by the blast. Sintering processes in the oxidizing zone lead to the formation of high-calcium silicates and calcium ferrites; recrystallisation of materials occurs in the plastic state directly at contact surfaces, but in the interval 1000-1300 mm from the tuyeres melting occurs. A minor part of the materials entering the oxidizing zone in the solid or plastic states

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is not affected appreciably.
There are 9 figures, 3 tables and 9 references, 4 of which are Soviet, 3 German and 2 English.

SUBMITTED: June 6, 1958

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SOV/180-59-2-1/34

AUTHORS: Gul'tyay, I.I., Zhilo, N.L., Rudneva, A.V., Sokolov, G.A. and Tsylev, L.M. (Moscow)

TITLE: Influence of Potassium Oxide on the Viscosity of Melts of the System Lime-Alumina-Silica in the Range Corresponding to the Compositions of Primary Blast-Furnace Slags (Vliyaniye okisi kaliya na vyazkost' rasplavov sistemy izvest'-glinozem-kremnezem v oblasti, sootvetstvuyushchey sostavam pervichnykh domennykh shlakov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Metallurgiya i Toplivo, 1959, Nr 2, pp 3-7 (USSR)

ABSTRACT: Analyses of real blast-furnace primary slags (Ref 1) show an appreciable alkali content. The effect of alkalies on the physical properties of slags with 0.5 and 10% alumina has been described by some of the authors (Refs 1,2); the present work relates to melts with about 16% alumina. The experimental method used was as previously described (Refs 2,3), the apparatus (Ref 4) being slightly modified to increase thermocouple-sheath life. The range of compositions covered was: 10.8 - 48.7% CaO; 34.1 - 55.8% SiO_2; 15.0 - 17.5% Al_2O_3; 0.0 - 23.2% K_2O; 0.21 - 1.35 CaO/SiO_2. Table 1 shows the compositions

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Influence of Potassium Oxide on the Viscosity of Melts of the System Lime-Alumina-Silica in the Range Corresponding to the Compositions of Primary Blast-Furnace Slags

and viscosities at 1300, 1350, 1400, 1450 and 1500 °C and the temperatures at the start of crystallization and at a viscosity value of 60 poise. Fig 1 shows lines of equal compositions for different values of viscosity, 16% Al_2O_3 and 1450 °C. Fig 2 shows isotherms for the start of crystallization for 16% Al_2O_3 slags. The viscosity and temperature of the start of crystallization are shown in Figs 3 and 4, respectively, as functions of the lime : silica ratio for various K_2O contents. The results show that the introduction of K_2O into the slags produces an increase in viscosity and crystallization temperature, the effect being most marked with slags having high lime : silica ratios. Addition of K_2O also reduces the range of the most fluid compositions, while the slag-viscosity minimum rises from 8 to 13 poise. The authors have estimated the mineralogical compositions of their slags (Table 2). Slags with minimal viscosity at 1450°C are characterized by the predominance of

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pseudo-wollastonite and gehlenite. With acid slag, increasing viscosity is due to formation of anorthite and free silica; with basic slags to formation of larnite.

Card 3/3 There are 4 figures, 2 tables and 9 references, 5 of which are Soviet and 4 English.

SUBMITTED: June 6, 1958

TSYLEV, L.M.; DMITRIYEV, G.N.; MAKHALOV, P.N.

Production and consumption of lignite coke in German Democratic Republic. Biul.tekh.-ekon.inform. no.2:82-84 '59. (MIRA 12:3)
(Germany, East--Coke industry)

SOV/180-59-3-4/43

AUTHORS: Gul'tyay, I.I., Zhilo, N.L., Sokolov, G.A. and Tsylev, L.M. (Moscow)

TITLE: The Influence of Magnesia on the Physical Properties of Blast Furnace Slags

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 3, pp 20-24 (USSR)

ABSTRACT: Some results of an investigation of the influence of magnesia on the viscosity and crystallisation temperature of blast furnace slags are given. The investigation was carried out in order to obtain an optimum composition of blast furnace slags possessing a minimum viscosity and maximum desulphurising power, applicable to the operating conditions of the Magnitogorsk Works. The viscosity of slags of the system CaO - MgO - 15% Al_2O_3 - SiO_2 was studied using samples of industrial Magnitogorsk slags with additions of magnesia and, in some cases, of lime and on samples of synthetic slags made from pure oxides. The viscosity measurements were carried out in a rotating electro-viscosimeter designed by the Academy of Sciences of the USSR (Ref 13) using carbon crucibles at temperatures

The Influence of Magnesia on the Physical Properties of Blast Furnace Slags

of 1400, 1450, 1500 and 1550°C. The experimental results are assembled in table 1. The results obtained indicated the range of compositions of slags of the quarternary system $CaO-MgO-Al_2O_3-SiO_2$ with a minimum viscosity: CaO from 27.5 to 44%; SiO_2 from 40 to 29.5%; MgO from 5 to 20% and Al_2O_3 - 15%. The ratio of CaO/SiO_2 in these slags varies from 0.80 to 1.30 and the ratio of $(CaO + MgO)/(SiO_2 + Al_2O_3)$ from 0.82 to 1.30. In order to explain the influence of magnesia on the mechanism of the viscous flow of slags, calculations of the activation energy $E\eta$ were carried out for slags with minimum viscosity. The activation energy varies from 26.7 to 47.5 k cal/mol, whereupon the minimum value was possessed by a slag with a CaO/SiO_2 ratio of 1.01 and a $(CaO + MgO)/(SiO_2 + Al_2O_3)$ ratio of 1.15 (Fig 4). There are 4 figures, 1 table and 13 references, 7 of which are Soviet and 6 English.

SUBMITTED: September 17, 1957

SOV/180-59-3-5/43

AUTHORS: Gromov, M.I. and Tsylev, L.M. (Moscow)

TITLE: On the Mechanism of Desulphurisation of Pig Iron with Solid Lime

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 3, pp 25-28 (USSR)

ABSTRACT: The existing theories on the mechanism of the transfer of sulphur from slag to metal are discussed. In order to study the mechanism of desulphurisation of pig iron (solid pig iron - solid lime and liquid pig iron - solid lime) experimental work has been carried out. In the first series of experiments ignited lime balls were placed in a crucible, surrounded by crushed pig (0.08 - 0.1% S) and heated to various temperatures (600 to 900°C) for periods of 20 minutes to 3 hours. In the second series lime balls were dipped into molten pig iron and retained in it for periods from 1 second to 15 minutes. The surface of the lime balls was then analysed by petrographic and X-ray methods. It was found that in no case did the lime surface contain iron but only CaO, CaS and in the case of solid iron $CaSO_4$, the amount of which was decreasing with increasing temperature at which the experiment was carried out. On the basis of the results

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On the Mechanism of Desulphurisation of Pig Iron with Solid Lime

obtained, the following mechanism of the desulphurisation with solid lime is postulated: in liquid metal, sulphur is present in the form of sulphur ions which are adsorbed on the surface of the lime, replacing oxygen in the crystal lattice:

$$[S] + (O^{2-}) \longrightarrow (S^{2-}) + [O]$$

As however, oxygen is more electronegative than sulphur, its bond with calcium should be stronger and probably some additional forces are necessary to replace it in the lattice with sulphur. It is thought that carbon has a weakening influence on the calcium oxygen bond. The apparatus used for the experiments for dipping lime balls into molten iron is shown in Fig 1. There is 1 figure and 5 references, 3 of which are Soviet and 2 English.

SUBMITTED: January 26, 1959

TSYLEV, Leonid Mikhaylovich; OSTROUKHOV, Mark Yakovlevich; KHODAK, Leonid Zalmanovich; ZINGER, S.L., red.izd-va; ATTOPOVICH, M.K., tekhn.red.

[Process of coke combustion in blast furnaces] Protsess goreniia koksa v domennoi pechi. Moskva, Gos.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1960. 98 p. (MIRA 13:5)

(Blast furnaces--Combustion) (Coke)

TSYLEV, L.M.

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SOV/16-S-5

Akademiya nauk SSSR. Institut metallurgii

Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody issledovaniya (Physicochemical Research Methods in Metallurgy and Metal Science) Moscow, Izd-vo AN SSSR, 1960. 251 p. (Series: Its: Trudy, vyp. 5) Errata slip inserted. 2,800 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova.

Resp. Ed.: I.P. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Klimov; Tech. Ed.: T.P. Polenova.

PURPOSE: This collection of articles is intended for metallurgists and metal researchers.

COVERAGE: The collection contains articles on metallurgy, metal science, and physicochemical research methods. Separate articles discuss the structure and properties of some metals and alloys. The effect of cold treatment and inclusions on the properties of alloys are analyzed, and instruments and

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methods used in investigating the processes occurring in metals and alloys are described. No personalities are mentioned. References accompany most of the articles.

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GESS, B.A.; CHERNYSHEV, A.M.; KANAVETS, P.I.; MELENT'YEV, P.N.; KHROMYAK, R.P.; VORONOV, Yu.G.; TSYLEV, L.M.; CHERNYKH, V.I.; BORISOV, Yu.I.; SPORIUS, A.E.; Prinimali uchastiye: TOLEROV, D.D.; MINKIN, V.M.; MARKIN, A.A.; GORLOV, M.Ya.; KHAYLOV, B.S.

Experimental blast furnace smelting with replacement in the charge of 20-per cent of the fluxed sinter by granules prepared by chemical catalysis. Trudy IGI 22:110-113 '63. (MIRA 16:11)

KOROBOV, L.N.; TSYLEV, L.M.; SHCHEDRIN, V.M.

Problems of the methods of investigating the kinetics of iron reduction from its oxides in molten ores by reducing gases. Stal' 25 no.8:867-871 S '65. (MIRA 18:9)

GROMOV, M.I. (Moskva); SHUBEKO, P.Z. (Moskva); TSYLEV, L.M. (Moskva); KOLESNIKOVA, L.L. (Moskva)

High speed magnetic roasting of iron ores in two-stage system vortex chambers. Izv. AN SSSR. Met. i gor. delo no.1:15-19 Ja-F '64. (MIRA 17:4)

PANOV, A.S.; KULIKOV, I.S.; TSYLEV, L.M.

Effect of calcium sulfide on the surface tension and density of $CaO - MgO - SiO_2$ melts. Zhur.fiz.khim. 37 no.1:169-173 Ja '63. (MIRA 17:3)

1. Institut metallurgii imeni Baykova.

ZUDIN, V.M.; YAKOBSON, A.P.; KOSTIN, I.M.; GALATONOV, A.L.; GAMAYUROV, A.I.; TSVERLING, A.L.; MALYSHEVA, T.Ya.; SOKOLOV, G.A.; RUDNEVA, A.V.; TSYLEV, L.M.; GUL'TYAY, I.I.

Effect of the sintering temperature on the mineralogical composition of sinter and its metallurgical properties. Stal' 23 no.6:481-485 Je '63. (MIRA 16:10)

1. Magnitogorskiy metallurgicheskiy kombinat i Institut metallurgii im. A.A.Baykova.

LYUTIKOV, R.A. (Moskva); TSYLEV, L.M. (Moskva)

Effect of chromium oxides on the viscosity and conductance of melts in the system silicon oxide - magnesium oxide - aluminum oxide. Izv. AN SSSR. Otd. tekh. nauk. Met. i gor. delo no.2:59-66 Mr-Ap '63. (MIRA 16:10)

CHERNYSHEV, A.M.; KISELEV, G.P.; GESS-de-KAL'VE, B.A.; TSYLEV, L.M.

Investigating certain properties of fluxed ore and fuel granules. Trudy Inst. met. no.12:3-12 '63. (MIRA 16:6)

(Sintering)
(Granular materials--Testing)

ARUTYUNOV, N.B., inzh., red.; VOSKOBOYNIKOV, V.G., doktor tekhn. nauk, red.; GOTLIB, A.D., prof., doktor tekhn.nauk, red.; GUSOVSKIY, A.A., inzh., red.; KRASAVTSEV, N.I., kand. tekhn. nauk, red.; NEKRASOV, Z.I., akademik, red.; OSTROUKHOV, M.Ya., kand. tekhn. nauk, red.; POKHVISNEV, A.N., prof., doktor tekhn.nauk, red.; RAMM, A.N., prof., doktor tekhn. nauk, red.; TSYLEV, L.M., prof., doktor tekhn. nauk, red.; POZDNYAKOV, G.L., red. izd-va; ISLENT'YEVA, P.G., tekhn. red.

[Blast furnace process according to most recent developments; on the 100th. anniversary of Academician M.A.Pavlov's birth] Domennyi protsess po noveishim issledovaniiam; k 100-letiiu so dnia rozhdeniia akad. M.A.Pavlova. Moskva, Metallurgizdat, 1963. 325 p. (MIRA 16:8)

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(Blast furnaces)
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PANOV, A.S.(Moskva); DANYUSHCHENKOV, I.A.(Moskva); KULIKOV, I.S.(Moskva); TSYLEV, L.M.(Moskva)

Effect of magnesium and barium oxides on the viscosity of silicate melts. Izv. AN SSSR.Otd.tekh.nauk. Met. i topl. no.5:37-42 S-O '62. (MIRA 15:10)

(Alkaline earth compounds) (Viscosity)

LYUTIKOV, R.A. (Moskva); TSYLEV, L.M. (Moskva)

Viscosity and electric conductivity of melts in the system magnesium oxide - silicon - aluminum oxide. Izv. AN SSSR. Otd. tekh. nauk. Met. i gor. delo no.1:41-52 Ja-F '63. (MIRA 16:3)
(Slag--Electric properties) (Viscosity)

TSYLEV, L.M.; RUDNEVA, A.V.; MALYSHEVA, T.Ya.

Phase transformations of fused materials during the melting of iron ores containing fluoride and rare earths. Trudy Inst. met. no.11:3-15 '62. (MIRA 16:5)
(Iron—Metallurgy) (Slag) (Phase rule and equilibrium)

PANOV, A.S. (Moskva); KULIKOV, I.S. (Moskva); TSYLEV, L.M. (Moskva)

Effect of calcium sulfide on the viscosity of alkaline earth metal aluminosilicate melts. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.3:27-32 My-Je '62. (MIRA 15:6)
(Aluminosilicates) (Viscosimetry)

TSYLEV, Leonid Mikhaylovich; DMITRIYEV, Georgiy Nikolayevich; MAKHALOV, Pavel Nikolayevich; SHAPOVALOV, I.K., red. ZINGER, S.L., red. izd-va

[Production and consumption of lignite coke in the German Democratic Republic] Proizvodstvo i potreblenie burougol'nogo koksa v Germanskoi Demokraticheskoi Respublike. Moskva, Metallurgizdat, 1961. 79 p. (MIRA 15:7)
(Germany, East--Lignite) (Coke)

PANOV, A.S. (Moskva); KULIKOV, I.S. (Moskva); TSYLEV, L.M. (Moskva)

Solubility of calcium sulfide in calcium oxide - magnesium oxide - silica melts. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.1:42-45 Ja-F '62. (MIRA 15:2)
(Metals—Sulfur content)
(Calcium sulfide)
(Solubility)

TSYLEV, L.M.; SERGEYEV, P.F.; KAPORULIN, V.N.; MATVEYEV, P.M.; VASIL'CHENKO, N.V.

Steam and air blowing as intensification of the blast furnace process. Trudy Inst. met. no.8:3-10 '61. (MIRA 14:10)
(Blast furnaces)

VAVILOV, N.S. (Moskva); TSYLEV, L.M. (Moskva); CHZHAO CHUN-CHZHI [Chao Ch'ung-chih] (Moskva)

Reduction of iron from ores in suspension with fountain effect. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.1:46-53 Ja-F '62. (MIRA 15:2)
(Iron--Metallurgy)

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E111/E135

18.3200

AUTHORS: Vavilov, N.S., Tsylev, L.M., and Chao Ch'ung-Chu (Moscow)

TITLE: Reduction of iron from ores in a fountaining fluidized bed

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no.1, 1962, 46-53

TEXT: The authors have previously described the results of a limited investigation of the reduction of ore-fuel granules with water gas in a fountaining-type fluidized bed. They later showed that in this case reduction proceeds especially rapidly at temperatures above 900 °C, whereas under stationary conditions this occurs only above 1000 °C. Laboratory melting of the iron sponge showed that it is a suitable substitute for scrap in steelmelting operations if the granules are made of concentrates with 65-70% iron. In the present article the authors describe laboratory investigations

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with a fountaining fluidized bed (Fig.2, where 1 is the column; 2 a conical orifice; 3 thermocouple sheaths; 4 platinum-rhodium/platinum thermocouple; 5 fluidized bed; 6 fountaining material). Charging and discharging arrangements are provided with a water-cooled receiver for rapid cooling of treated samples in a stream of nitrogen. Very rapid heating rates were obtained in the reactor (Fig.3 shows temperature, °C - time, min; curves for 0.5-1.0 mm fractions of iron ore being reduced in hydrogen; curves 1, 2 and 3 corresponding to charge weights of 20, 30 and 40 g respectively, in a 25 mm diameter reactor). Fig.4 shows reduction curves for the 0.25-0.5 mm fraction of one ore (44.45% Fe_{tot}, 63.36 Fe_2O_3, 19.47 SiO_2, 4.68 Al_2O_3, 0.62 Mn, 9.53 loss on ignition, remainder CaO, MgO, S, P, H_2O) in hydrogen in a 20 mm diameter reactor. Top graph gives bed temperature, and bottom left-hand graph the reduction parameters as functions of time, min. Curve 1 corresponds to Fe_{tot}, curve 2 to Fe_{met}, curve 3 to $\varphi = Fe_{met}/Fe_{tot}$, curves 4 and 5 to iron contents in the

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Reduction of iron from ores in ...

concentrate of β_1 and β_2, respectively, curves 6 and 7 to metallic-iron contents in the concentrate of k_1 and k_2 respectively, curve 8 to yield of primary concentrate γ_1, curve 9 is $\varphi_1 = (k_1/\beta_1) \times 100$, curve 10 is $\varphi_2 = (k_2/\beta_2) \times 100$. The right-hand graph gives Fe_{tot}, Fe_{met} and $\varphi = Fe_{met}/Fe_{tot} \times 100$ (curves 1, 2 and 3 respectively) as functions of temperature for holding times of 5 min. Dry magnetic concentration of the sponge iron in the laboratory removed silica, two concentrates being obtained. One had a high iron content (about 80%) but relatively low yield of about 73, iron recovery being up to 80-85% and silica content about 14%. The authors note that from one ore a 95% iron content powder was obtained, even when a fairly high silica content was allowed in order to improve yield, this result being better than in Wiberg sponge iron (Ref.4: M. Viberg, Sovremennyye problemy metallurgii (Present problems in metallurgy), 208-221, Izd.-vo AS USSR, 1958). The metallic powder obtained by the method is easy to briquette. With some ores reduction was carried out successfully in a stream of mixed gas (58.0% CH_4, 33.6 H_2, 6.0 CO, 0.8 CO_2, 1.6 O_2), the

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